BRD8065/D
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ON Semiconductor®

Energy Efficient Innovations

Home Entertainment Solutions

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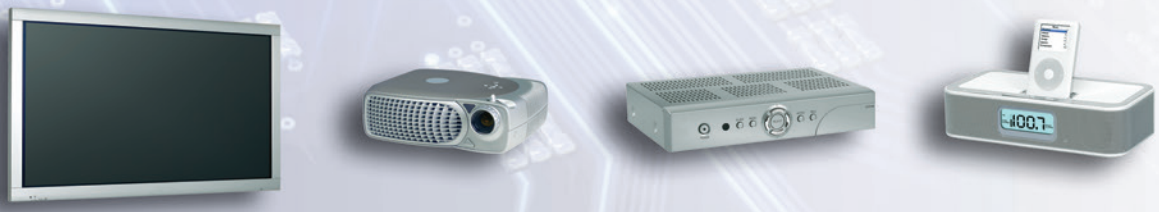
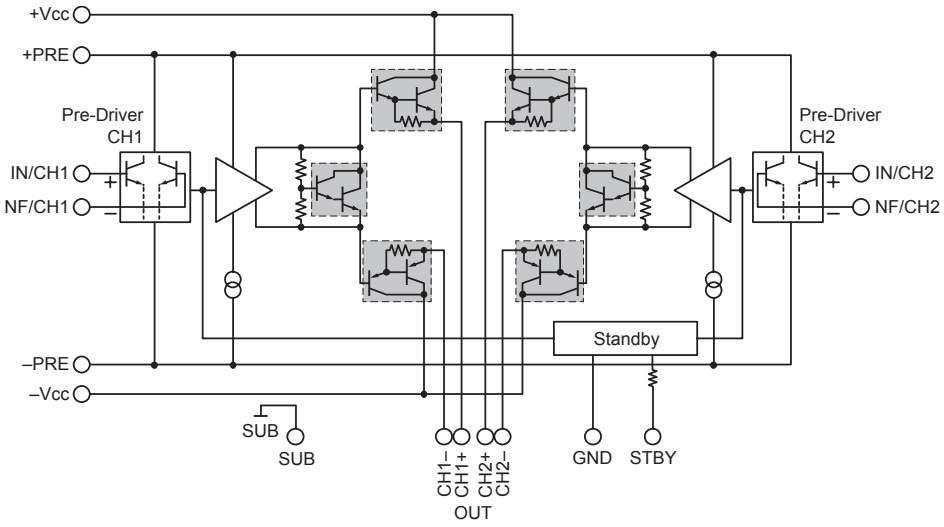
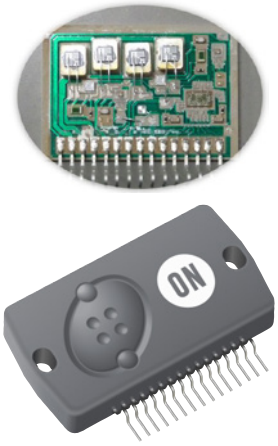


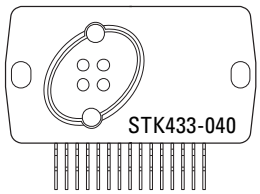
Audio Amplifier Hybrids

Features

- Pre-driver and power transistors integrated in one package
- Broad portfolio, from 1 to 4 channels; pin configuration is compatible within each series (STK404 series, STK433 series)
- Allowable load shorted time is 0.3 second
- Allows the use of predesigned applications for standby and mute circuit

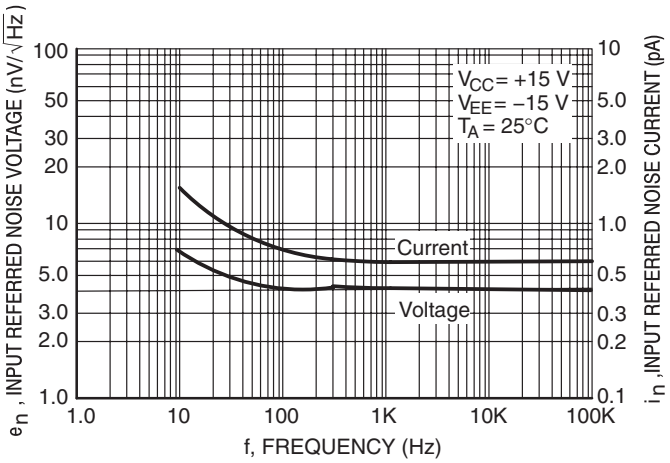






Device	Type	Channels	V_{CC} Max (V), 6 Ω	P_O Max (W), 10%, 1 kHz	Package
STK404-070N-E	Class AB	1	± 39	60 x 1	SIP-10
STK404-120N-E	Class AB	1	± 59	120 x 1	SIP-12
STK404-140N-E	Class AB	1	± 73	180 x 1	SIP-13
STK433-040N-E	Class AB	2	± 36	40 x 2	SIP-15
STK433-060N-E	Class AB	2	± 40	50 x 2	SIP-15
STK433-130N-E	Class AB	2	± 63	150 x 2	SIP-15
STK433-330N-E	Class AB	3	± 63	150 x 3	SIP-19
STK433-840N-E	Class AB	4	± 36	40 x 4	SIP-23
STK433-890N-E	Class AB	4	± 47	80 x 4	SIP-23

Amplification and Buffering for Audio Signals



MC33077 Input Referred Noise Voltage and Current vs Frequency

Key Features

- Low noise
- Fast response times
- Single, dual and quad devices

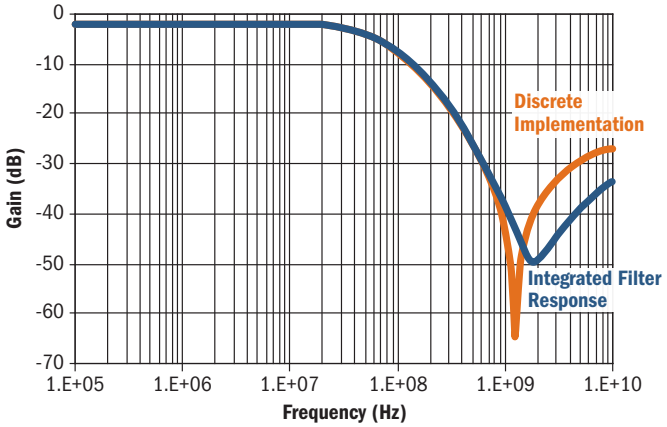
Low Noise Operational Amplifiers

Device	Channels	Noise Typ (nV/√Hz)	GBW Typ (MHz)	SR Typ (V/μs)	Package
LM833	2	4.5	15	7	SOIC-8, PDIP-8
MC33077	2	4.4	37	11	SOIC-8, PDIP-8
MC33078	2	4.5	16	7	SOIC-8, PDIP-8
MC33079	4	4.5	16	7	SOIC-14, PDIP-14
MC33178	2	7.5	5	2	Micro8, SOIC-8, PDIP-8
MC33179	4	7.5	5	2	TSSOP-14, SOIC-14, PDIP-14
MC33272A	2	18.0	24	10	SOIC-8, PDIP-8
MC33274A	4	18.0	24	10	SOIC-14, PDIP-14
NE5532	2	5.0	10	9	SOIC-8, PDIP-8
NE5534	1	4.0	10	13	SOIC-8, PDIP-8

Audio Filters – RC & LC EMI Filters with ESD Protection

Key Features

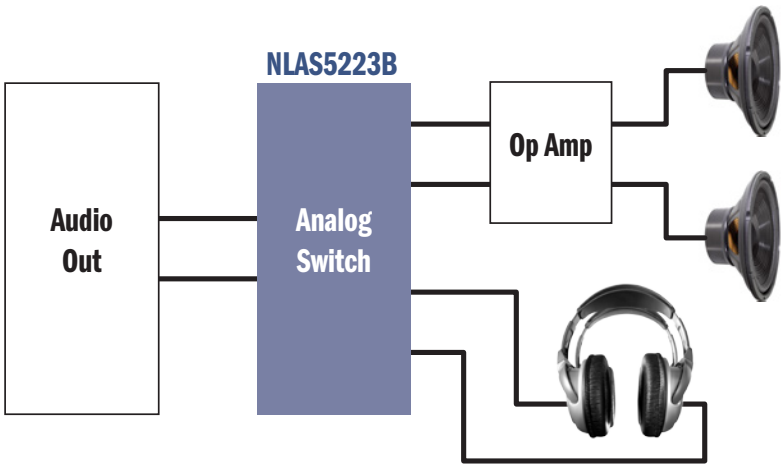
- ESD protection exceeds 8 kV contact (IEC 61000-4-2)
- Matched inductors and capacitors
- Lowest insertion loss, critical for analog signals
- Excellent filtering performance across all wireless bands
- Integrates large scale capacitive elements with resistors or inductors to create excellent noise attenuation starting at 22 MHz

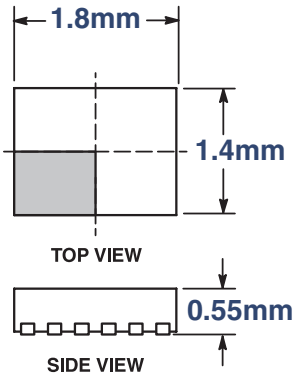


Audio Filters

Device	Description	Type	Lines	f3 dB (MHz)	Attenuation (-dB @ 1 GHz)	IEC 61000 (kV)	Package
NUF2114	2 Line Audio EMI Filter with ESD Protection	RC	2	50	-35	30	DFN-8
NUF2116	2 Line Audio EMI Filter with ESD Protection	RC	2	55	-43	30	DFN-8
NUF2441	Integrated Passive Filter with ESD Protection	LC	2	25	-35	8	FlipChip-6
NUF2450	2 Line EMI Filter with ESD Protection	LC	2	20	-40	20	µDFN-8
NUF4220	4 Line Audio EMI Filter with ESD Protection	LC	4	16	-38	18	DFN-8

Low Resistance Switching for Audio Signals





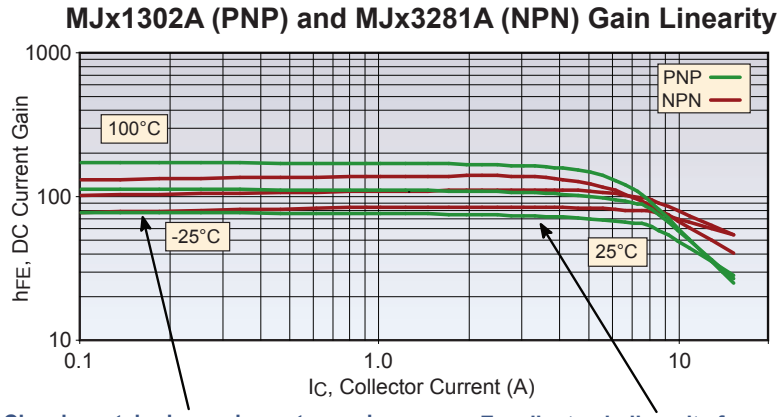
Audio Switches

Device	Description	Channels	R_{ON} Max (Ω)	Package
NLAS5157	Single SPDT	1	0.5	μDFN-6
NLAS5223B	Dual SPDT	2	0.5	μQFN-10
NLAS3799B	Dual DPDT	4	0.5	μQFN-16

Key Performance Characteristics

- Excellent Audio Fidelity - Very Low THD, 0.011% Typical
- Wide 1.65 - 4.5 V Power Supply Range
- Extended Temperature Capable
- Low $R_{DS(on)}$, Tight Channel Matching

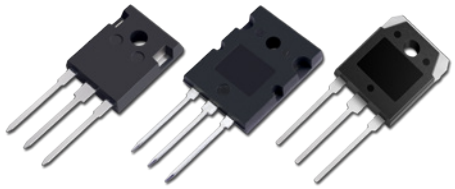
Audio Transistors for Superior Linearity and Gain Matching



Closely matched complementary pairs assure symmetrical performance while minimizing manual gain sorting

Excellent gain linearity for accurate reproduction of input signal

Device Number		P_D @ 25°C (W)	V_{CEO} (V)	I_C Max (A)	h_{FE}		f_T (MHz)	Package
NPN	PNP				Min/ Max	@ I_C (A)		
NJW0281	NJW0302	50	150	8	20 min	4	30	TO-3P
MJW3281A	MJW1302A	200	260	15	75/150	5	30	TO-247
MJL3281A	MJL1302A	200	260	15	75/150	5	30	TO-264
NJW3281	NJW1302	200	260	15	75/150	5	30	TO-3P



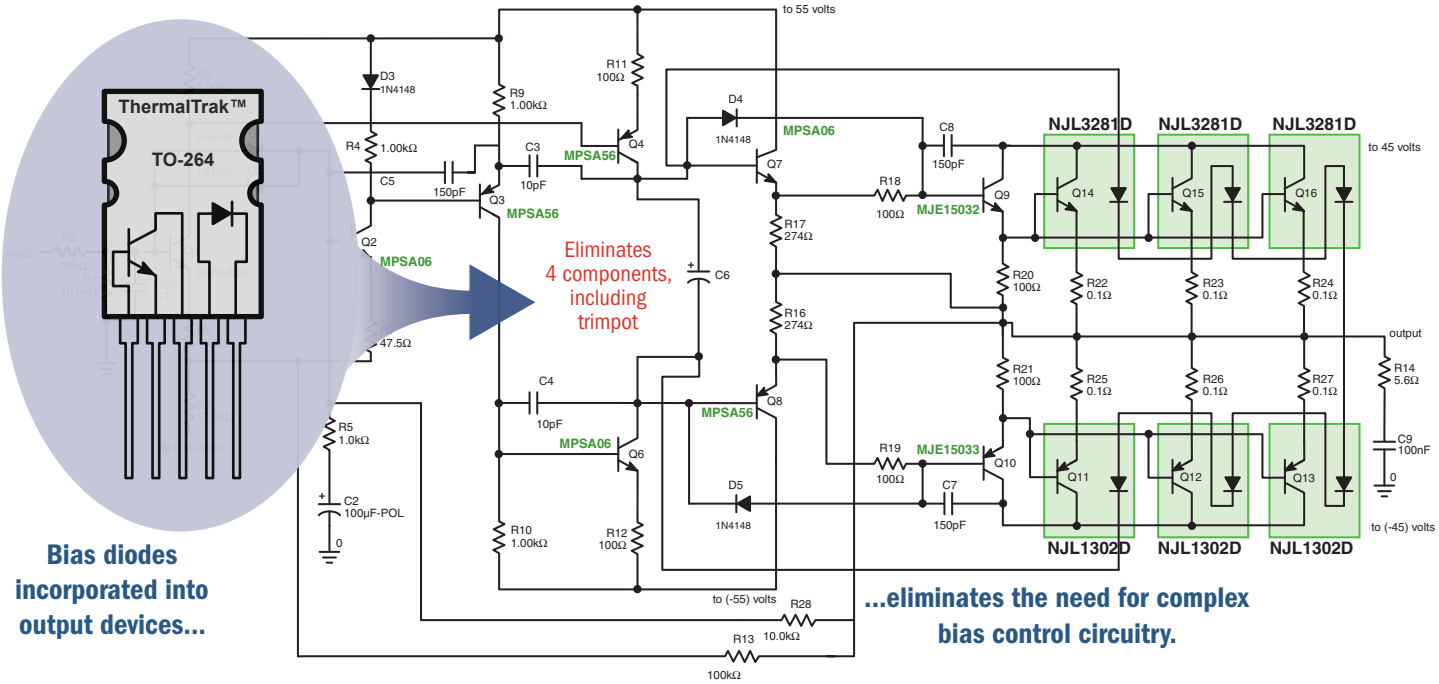
260 V Capability for Greater Dynamic Range

Power Bipolar Audio Output Transistors

RMS Power Output	NPN	PNP	P_D @ 25°C (W)	V_{CEO} (V)	I_C Max (A)	h_{FE}		f_T Typ (MHz)	Package
						Min/Max	@ I_C (A)		
Up to 50 W	MJE15030	MJE15031	50	150	8	20 min	4	30	TO-220
	MJE15032	MJE15033	50	250	8	50 min	1	30	TO-220
	MJE15034	MJE15035	50	350	4	50 min	1	30	TO-220
50 to 180 W	NJW44H11	–	120	80	10	100/400	2	85	TO-3P
	MJ15003	MJ15004	150	140	20	25/150	5	3	TO-3
	NJW0281	NJW0302	150	260	15	75/150	3	30	TO-3P
	MJ15015	MJ15016	180	120	15	20/70	4	3	TO-3
180 to 200 W	MJL21196	MJL21195	200	200	16	25/75	8	4	TO-264
	MJW21194	MJW21193	200	250	16	20/60	8	4	TO-247
	MJW21196	MJW21195	200	250	16	25/60	8	4	TO-247
	MJL21194	MJL21193	200	250	16	25/75	8	4	TO-264
	MJW3281A	MJW1302A	200	260	15	75/150	5	30	TO-247
	MJL3281A	MJL1302A	200	260	15	75/150	5	30	TO-264
	NJW3281	NJW1302	200	260	15	75/150	5	30	TO-3P
> 200 W	MJ15024	MJ15025	250	250	16	15/60	8	4	TO-3
	MJ21194	MJ21193	250	250	16	25/75	8	4	TO-3

Finally: A Solution that Works!
For Eliminating Thermal Lag and Improving Fidelity

ThermalTrak™ family of output transistors provides a simplified, single device solution.

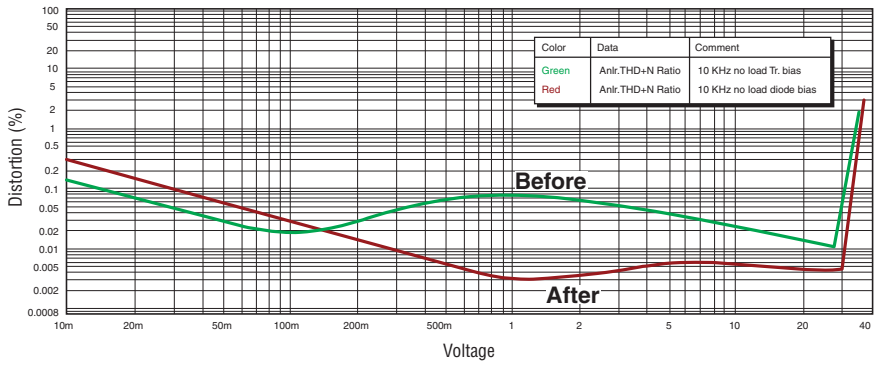


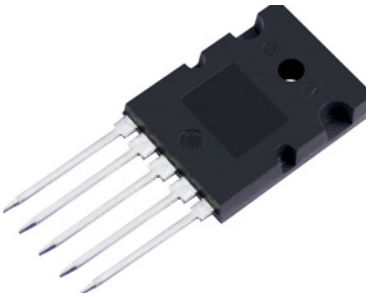
Bias diodes incorporated into output devices...

...eliminates the need for complex bias control circuitry.

Vastly improves bias stability and helps eliminate thermal shock

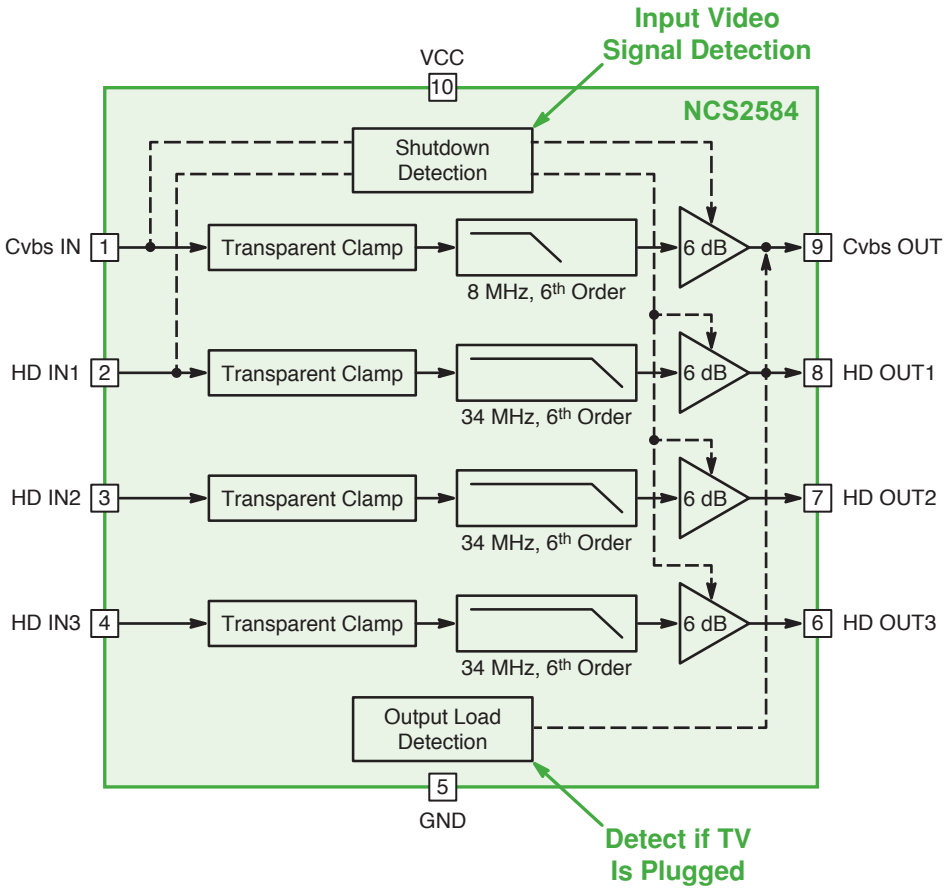
Audio Amplifier Performance
Standard Industry Design vs. ThermalTrak™ Solution





Device Number		P_D @ 25°C	V_{CEO}	I_C Max	h_{FE}		f_T	
NPN	PNP	(W)	(V)	(A)	Min/Max	@ I_C (A)	(MHz)	Package
NJL0281D	NJL0302D	180	260	15	75/150	3	30	TO-264-5
NJL3281D	NJL1302D	200	260	15	75/150	7	30	TO-264-5
NJL4281D	NJL4302D	250	350	15	75/150	5	30	TO-264-5

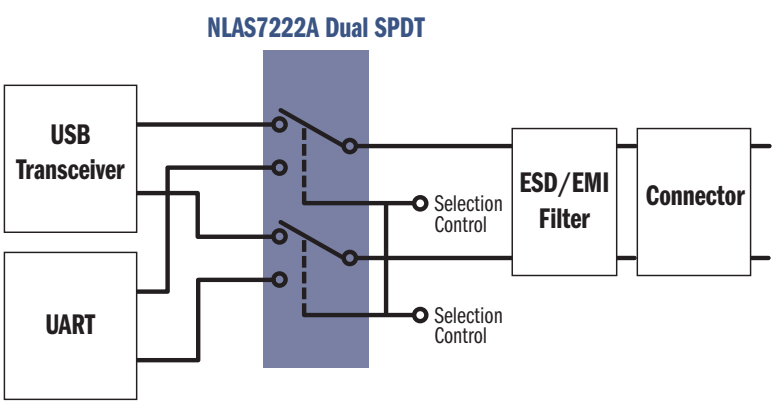
Amplification for Video Signals

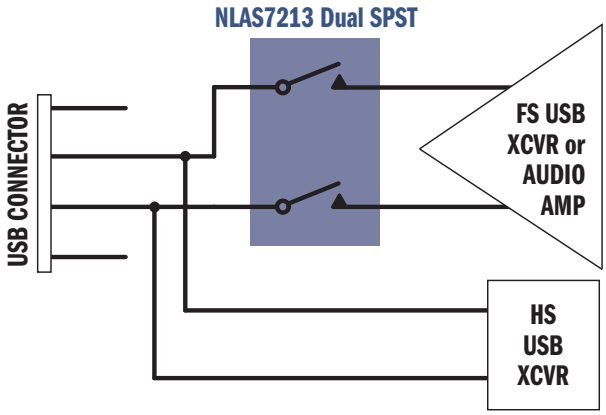


Video Amplifiers

Device	Channels	G_{BW} Typ (MHz)	V_{CC} Max (V)	Package
NCS2566	6	8/34	5	TSSOP-20
NCS2564	4	8/34	5	TSSOP-14
NCS2584	4	8/34	3.3	TSSOP-14
NCS2563	3	30	5	SOIC-8
NCS2553	3	8	5	SOIC-8
NCS2561	1	8	3.3	SC-70
NE592x8	1	40	8	SOIC-8, PDIP-8
NE592x14	1	90	8	SOIC-14, PDIP-14

USB Switching Devices

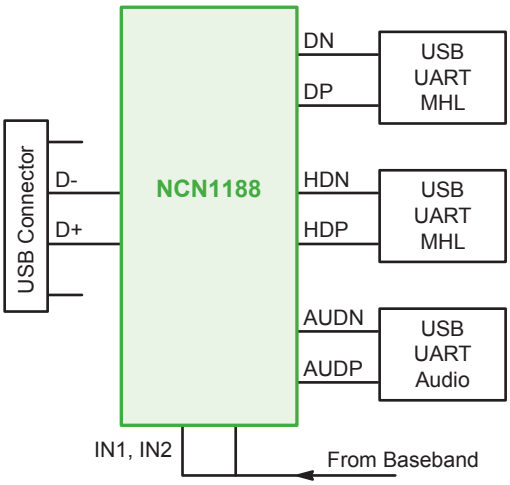




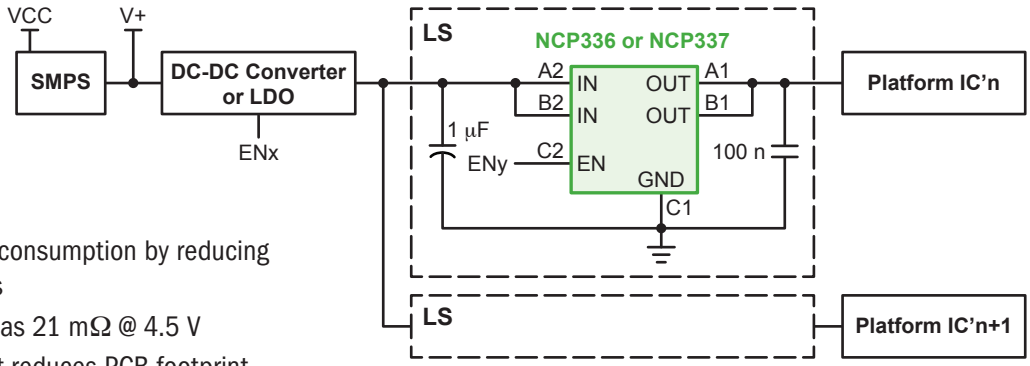
Device	Configuration	R_{ON} (Max) Ω	C Typ (pF)	Package
NLAS7222A/B/C	DPDT	9	6.5	WQFN-10, μQFN-10
NLAS7242	DPDT	9	6.5	μQFN-10
NLAS4717EP	DPDT	4.5	38	Flip-Chip 10
NLAS7213	DPST	10	3	μQFN-8
NCN1188	DP3T	7.5	4.5	μQFN-12
NCN9252	DP3T	6	20	μQFN-12
NLAS8252	DP3T	10	30	μQFN-12

Key Performance Characteristics

- Passes USB 2.0 High Speed Signals
- 6.5 Ω Typical R_{DSon} @ 3.0 V
- 500 MHz Bandwidth
- Low Crosstalk: -45 dB @ 250 MHz
- Smallest Package in the Industry



Power Distribution Load Switches



NCP336, NCP337 Application Diagram

Features

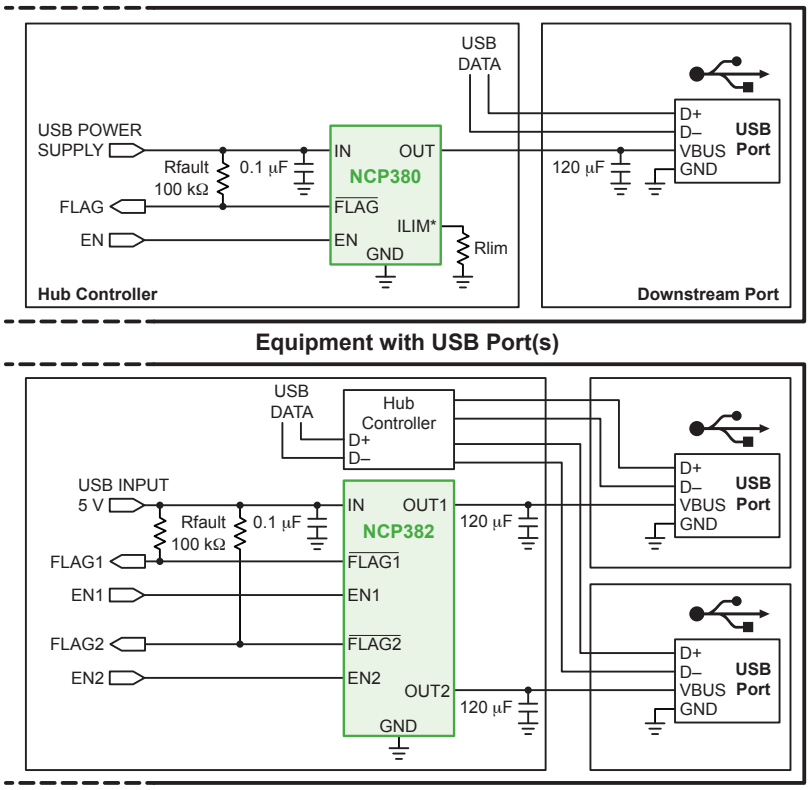
- Optimize power consumption by reducing current leakages
- $R_{DS(ON)}$ as low as 21 mΩ @ 4.5 V
- Simplified layout reduces PCB footprint
- WLCSP and DFN packages, as small as 0.76 mm x 0.76 mm

Load Switches

Device	Discharge Path	I_{OUT} Max (A)	$R_{DS(ON)}$ (mΩ)	V_{CC} Min (V)	V_{CC} Max (V)	Package
NCP333	Yes	1.5	55 @ 3.3 V	1.2	5.5	WLCSP-4
NCP433	Yes	1.5	50 @ 1.8 V	1.0	3.6	WLCSP-4
NCP334	No	2	47 @ 3.3 V	1.2	5.5	WLCSP-4
NCP335	Yes	2	47 @ 3.3 V	1.2	5.5	WLCSP-4
NCP434	No	2	29 @ 3.3 V	1.2	3.6	WLCSP-4
NCP435	Yes	2	29 @ 3.3 V	1.2	3.6	WLCSP-4
NCP437	Yes	2	24 @ 1.8 V	1.0	3.6	WLCSP-4
NCP336	No	3	21 @ 4.5 V	1.2	5.5	WLCSP-6
NCP337	Yes	3	21 @ 4.5 V	1.2	5.5	WLCSP-6
NCP338	Yes	3	16 @ 3.6 V	1.0	3.6	WLCSP-6
NCP330	No	3	26 @ 3.0 V	1.8	5.5	UDFN-4

Power Protection

Over-Current Protection for USB Host



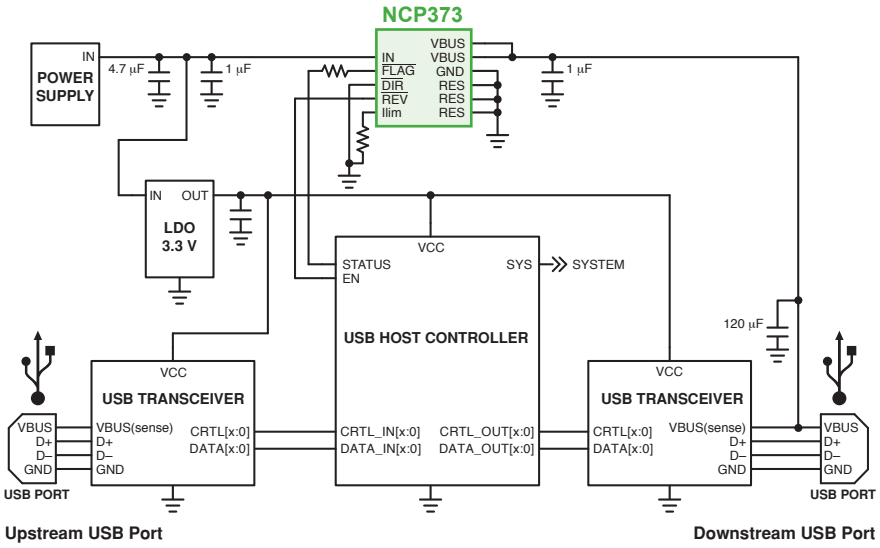
NCP380, NCP382, NCP383 – Single & Dual Channel Current Protection Switches

- Protect equipment with USB port from being damaged by short circuit or over-load event
- Very fast short circuit detection time as low as 1 μs
- Accurate current limit threshold
- Fixed or adjustable current limit (100 mA - 2.8 A)
- Supports high current tablet PC charging
- UL certified

Over-Current and Over-Voltage Protection for USB Host

NCP373, NCP374 – ±28 V OVP Load Switch

- Protects Vbus input from ±28 V over-voltage
- Adjustable current limit sourcing to Vbus, 400 mA or 1.3 A
- Compliant to IEC61000−4−2 (Level 4)
- LLGA-12 package



USB 2.0 for Consumer

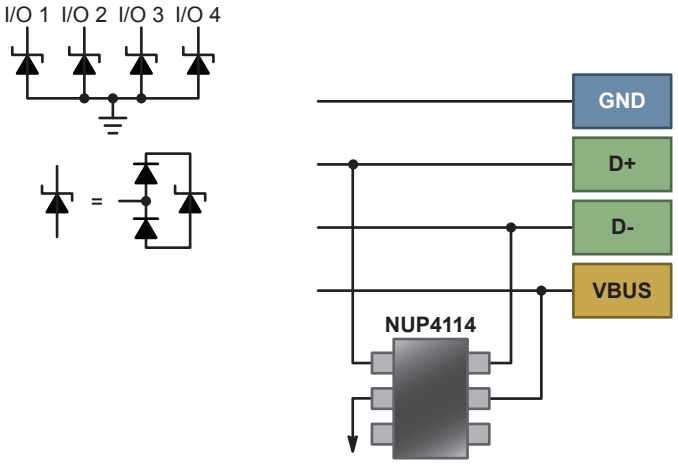
One High Speed Pair, V_{CC}, Low Capacitance ESD Protection

Key Requirement

- Cap < 1.5 pF

Features

- 0.5 - 0.8 pF
- 4 low speed + 1 VBUS integrated – can protect up to 2 USB ports
- Industry leading low clamping voltage



Device	Lines	Capacitance (pF)	Package	Size (mm)
NUP4114UPX	4	0.8	SOT-563	1.6 x 1.6
NUP4114UCL	4	0.5	SC-88	2.0 x 2.1
NUP4114H	4	0.8	TSOP-6	3.0 x 2.75
ESD7L5.0	2	0.5	SOT-723	1.2 x 1.2
ESD9L5.0	1	0.5	SOD-923	1.0 x 0.6

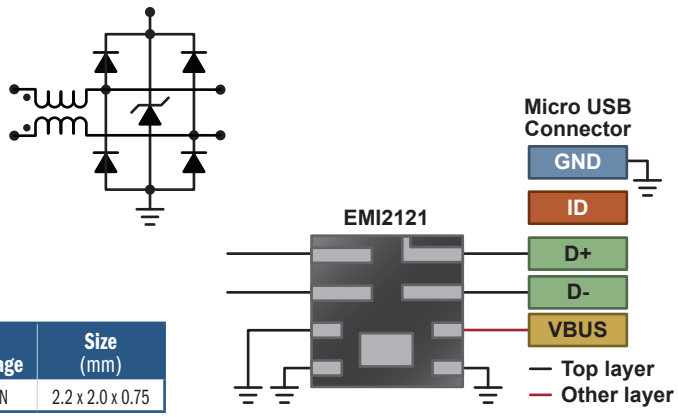
One High Speed Pair, V_{CC}, Common Mode Filter + ESD Protection

Key Requirement

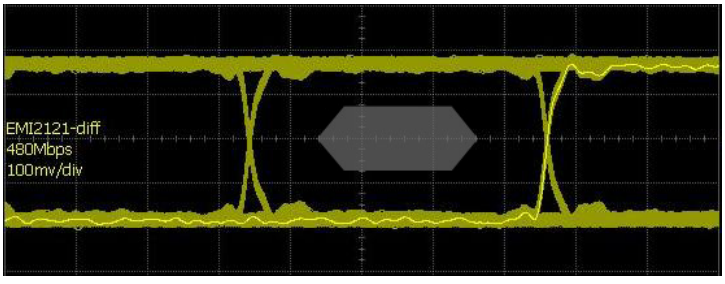
- Cap < 1.5 pF
- Common Mode Filtering

Features

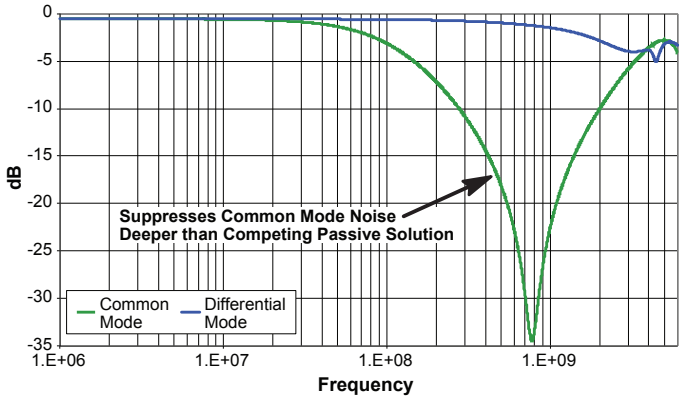
- 0.5 - 0.8 pF
- Integrated EMI suppression with ESD protection
- Industry leading low clamping voltage



Device	Pairs	Capacitance @ 2.5 V (pF)	CM Attenuation @ 800 MHz (-dB)	DM Bandwidth F3dB (GHz)	Package	Size (mm)
EMI2121	1	0.9	-25	2.5	WQFN	2.2 x 2.0 x 0.75



USB 2.0 @ 480 Mb/s



USB 3.0 for Consumer

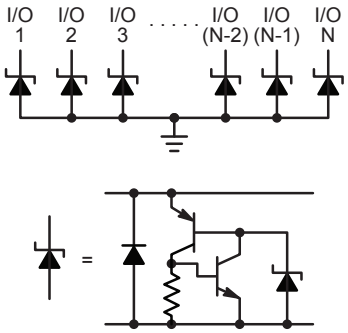
Two SuperSpeed Pairs, One High Speed Pair, V_{CC}, Low Capacitance ESD Protection

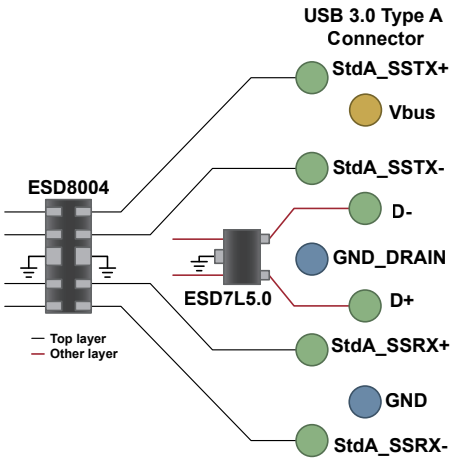
Key Requirement

- Cap < 0.5 pF

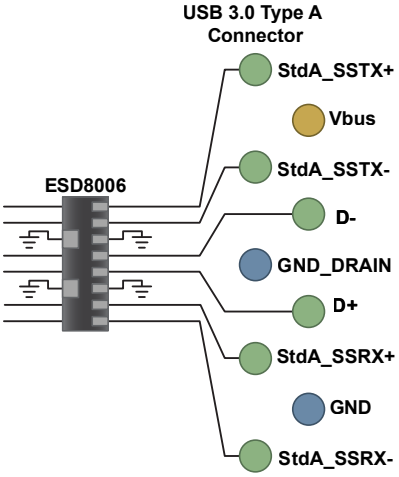
Features

- 0.30 pF
- Flow through routing
- Industry leading low clamping voltage versus competitors





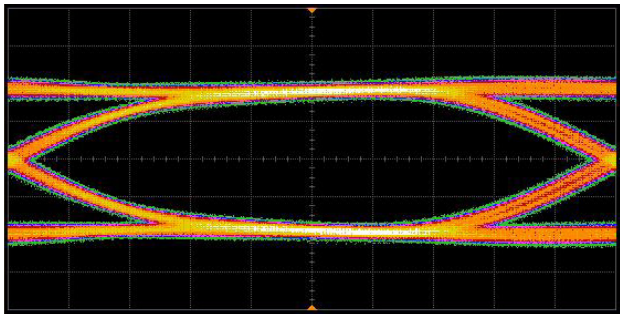
ESD8004 – 0.32 pF, 2 Layer Routing
(ESD8004; ESD7L5.0 for D+, D- Lines)



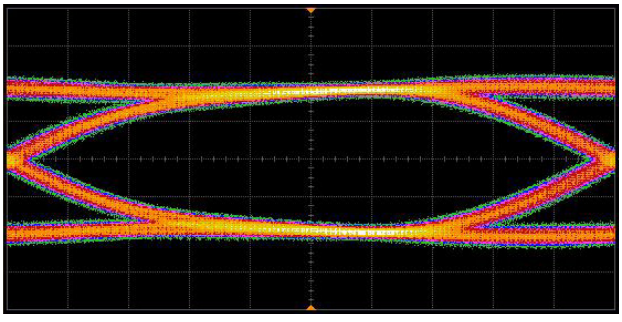
ESD8006 – 0.29 pF, 1 Layer Routing

Device	Lines	Capacitance (pF)	Package	Size (mm)
ESD8006*	6	0.29	UDFN-8	3.3 x 1.0
ESD8004	4	0.32	UDFN-10	2.5 x 1.0
ESD7L	2	0.5	SOT-723	1.2 x 1.2

* Pending 1Q14.



Without ESD



With ESD

USB 3.0 @ 5 Gb/s

HDMI, Display Port for Consumer

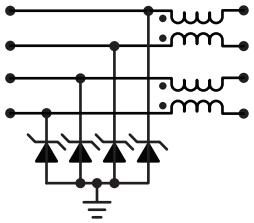
Four High Speed Pairs, Up to Six Additional Lines, Low Capacitance ESD + Common Mode Filters

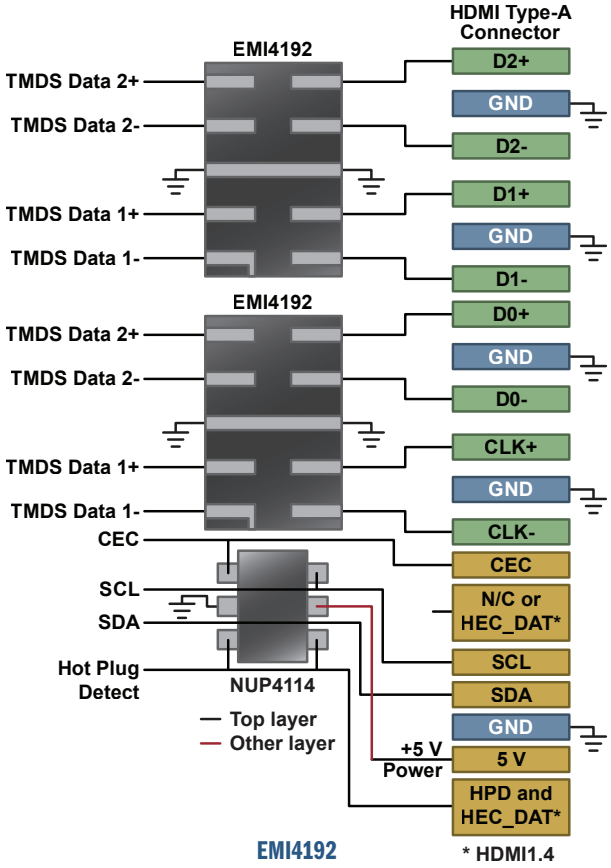
Key Requirement

- Cap < 0.5 pF
- Common Mode Filtering

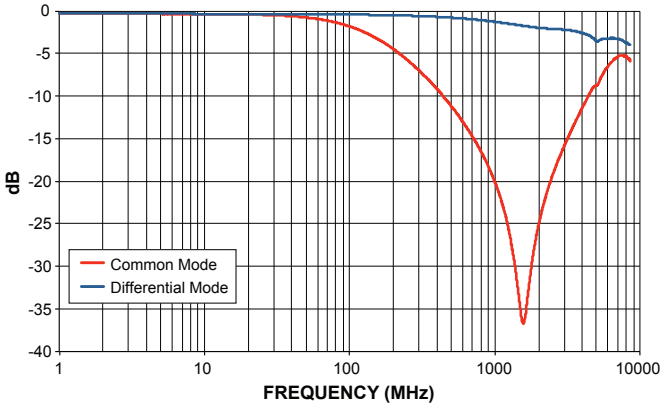
Features

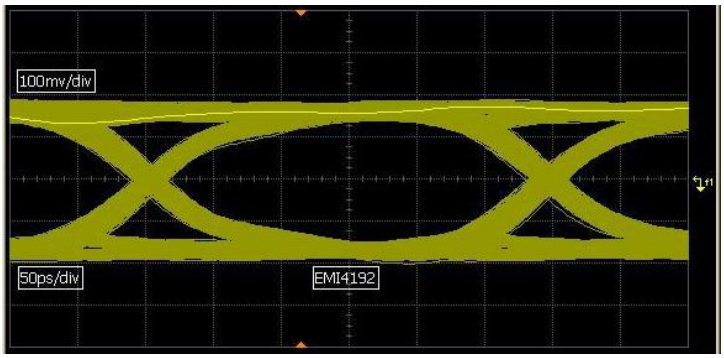
- 0.4 pF ESD protection
- CM Rejection – 11 dB at 500 MHz
- DM Insertion Loss – 0.5 dB at 500 MHz
- Flow through routing in high speed lines
- Industry leading low clamping voltage





Device	Pairs	Capacitance @ 2.5 V (pF)	CM Attenuation @ 900 MHz (-dB)	DM Bandwidth F3dB (GHz)	Package	Size (mm)
EMI4192	2	0.8	-16	4	WDFN-10	2.5 x 2.0 x 0.50





HDMI 1.4 Requirement – 3.4 Gb/s

HDMI, Display Port for Consumer

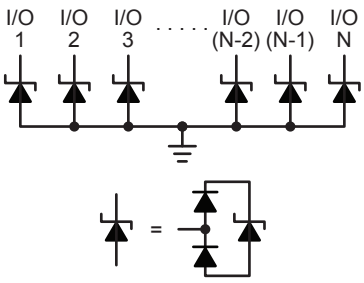
Four High Speed Pairs, Up to Six Additional Interface Lines, Low Capacitance ESD

Key Requirement

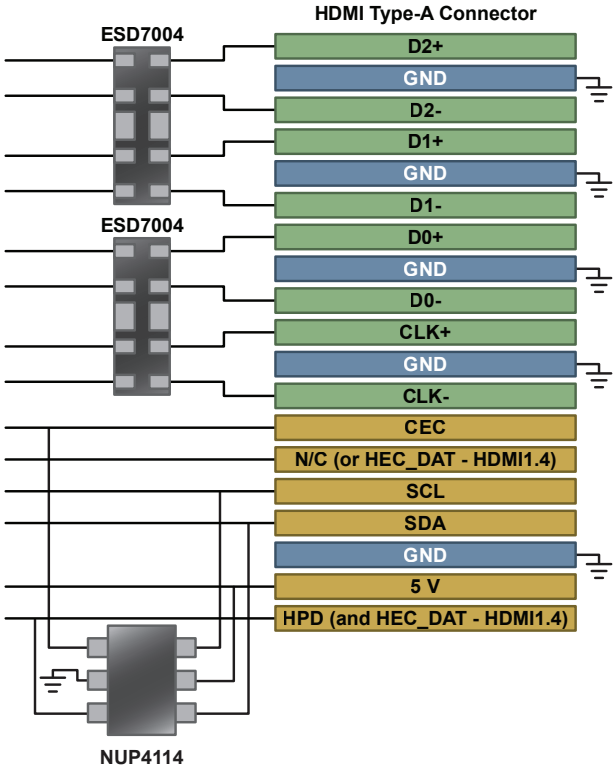
- Cap < 0.5 pF

Features

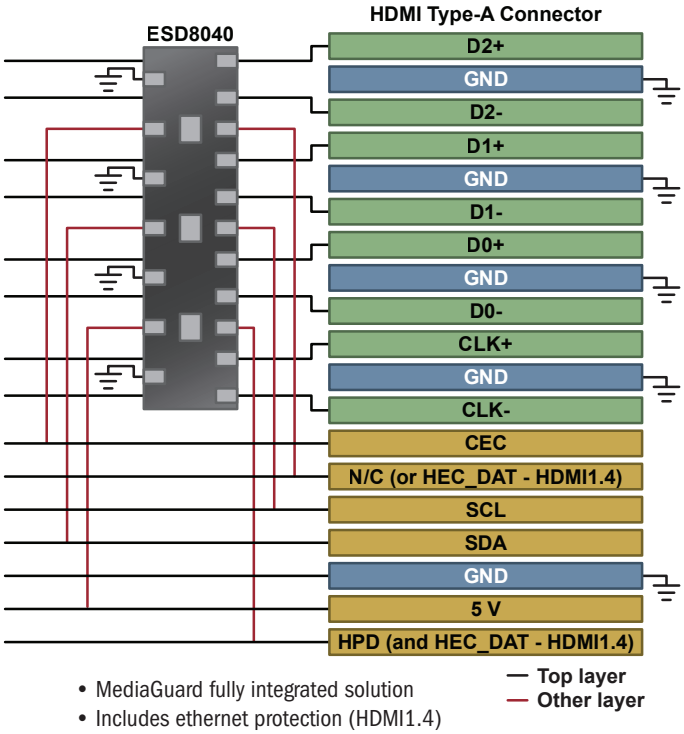
- 0.4 pF ESD protection
- Flow through routing in high speed lines
- Industry leading low clamping voltage



Device	Lines	Capacitance (pF)	Package	Size (mm)
ESD7004	4	0.4	UDFN-10	2.5 x 1.0
ESD8040	14	0.3	UDFN-18	5.5 x 1.5

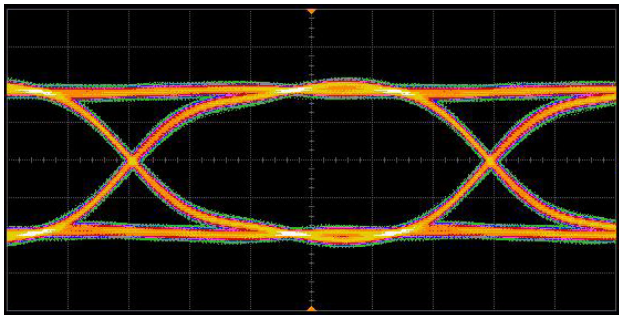


ESD7004

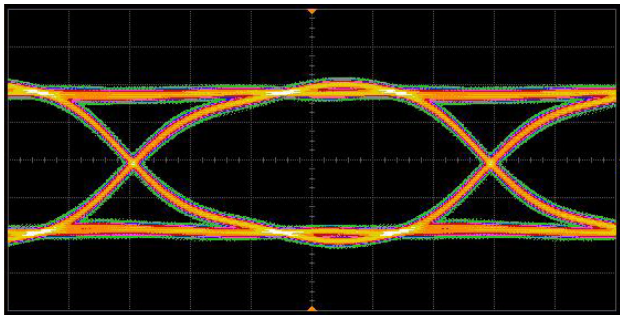


- MediaGuard fully integrated solution
- Includes ethernet protection (HDMI1.4)
- Backdrive current protection

ESD8040



Without ESD



With ESD

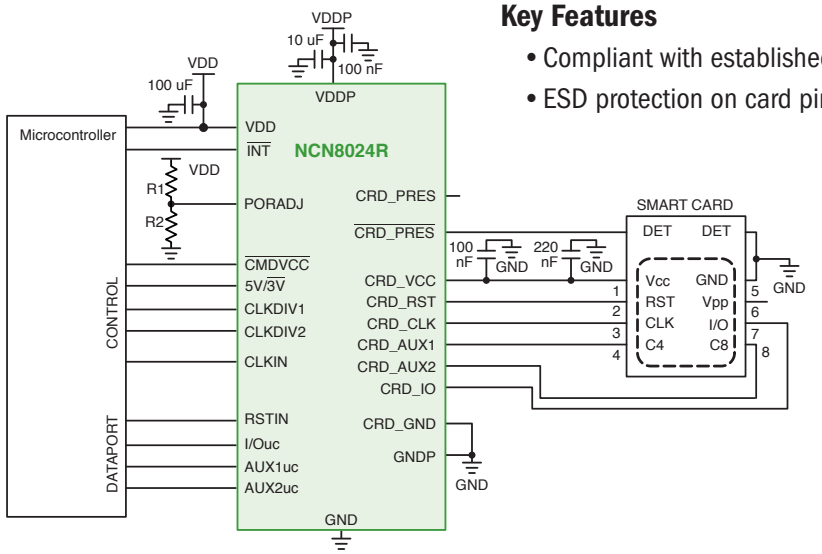
HDMI 1.3 & 1.4 = 3.4 Gb/s

Consumer Interface Solutions

Interface	Data Pairs	Max Data Rate (Gb/s)	Multi-Device	Single Device	ESD + Filter Device
USB3.0	2	5.0	ESD8004 (Tx, Rx), ESD7L (D+, D-)	ESD8006*	–
Thunderbolt	4	10	ESD8006* (x2), ESD8004 (x2)	ESD8008†*	–
HDMI 1.2	4	1.65	ESDR0524P† (x2)	MG2040, ESD8040	EMI4192† (x2)
HDMI 1.3/1.4	4	3.4	ESD7004† (x2), ESD7008*	MG2040, ESD8040	EMI4192† (x2)
Display Port V1.1	2, 4	2.7	ESD7004†	MG2040, ESD8040	EMI4182†
Display Port V1.2	2, 4	5.4	ESD8004†, ESD8008†*	MG2040, ESD8040	EMI4182†
DVI	Up to 6	1.65	ESD7L5.0, NUP4114	–	–
USB2.0	1	480 Mb/s	ESD7L5.0, ESD9X5.0 (V_{CC})	NUP4114	EMI2121
eSATA 1.0	2	1.5	ESD7L (x2)	ESDR0524P	–
eSATA 2.0	2	3.0	ESD7L (x2)	ESD7004	–
eSATA 3.0	2	6.0	–	ESD8004	–
10/100 Ethernet	2	50 Mb/s	–	ESD1014	–
Gigabit Ethernet	4	250 Mb/s	ESD1014 (x2)	–	–
V-by-one	4	3.75	ESD8008†*	–	–

* Pending 1Q14. † Use with NUP4114 to address lower speed analog lines.

Smart Card Interfaces



NCN8024R Application Diagram

Key Features

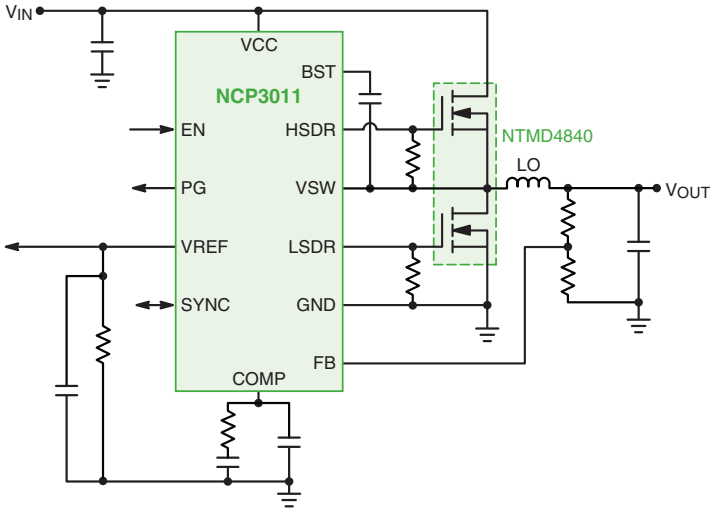
- Compliant with established pay-TV standards
- ESD protection on card pins up to +8 kV (Human Body Model)

	Device	Aux I/O Lines	Control Interface	Card Type	V_{DD} µC Interface (V)	Power Supply	Sequencer	Card Detect	Clock Divider	Standards	Package(s)
Smart Card	NCN8024R	2	Parallel	A, B	2.7 – 5.5	LDO	Yes	Yes	Yes	ISO7816; EMV4.3; NDS	SOIC-28W
	NCN8025/A (SAM/SIM)	0/2	Parallel	A, B, C	2.7 – 5.5	LDO	Yes	Yes	Yes	ISO7816; EMV4.3; NDS; UICC	QFN-16, QFN-24
	NCN8026A (SAM/SIM)	2	Parallel	A, B, C	1.6 – 5.5	LDO	Yes	Yes	Yes	ISO7816; EMV4.3; UICC; SIM	QFN-24

Switching Controllers

NCP3011 Key Features

- Wide input voltage range
- Buffered external +1.25 V reference
- PowerGood + Enable/Disable pins
- External synchronization
- Output overvoltage and undervoltage protection



Switching Controllers

Device	fSW (kHz)	Vin Min (V)	Vin Max (V)	Vout Max (V)	Comments	Package
NCP1587	250-300	4.5	13.2	Down to 0.8	1 A drive capability; short circuit protection	SOIC-8
NCP1589D	300/600	4.5	13.2	Down to 0.8	Light load efficiency	SOIC-8
NCP5422A	150-600	10.8	13.2	Down to 1.0	Hiccup mode overcurrent protection	SOIC-16
NCP5425	150-750	4.5	13.2	Down to 0.8	Dual output	TSSOP-20
CS51031	200-700	4.5	16	Down to 1.25	No compensation required; PFET	SOIC-8
LV5061V	300-2200	4.5	18	Down to 1.26	90 µA light load current consumption	SSOP-16
NCP3011	400	4.7	28	Down to 0.8	PG, EN, SYNC features	TSSOP-14
NCP3020	300/600	4.7	28	Down to 0.6	Ceramic output capacitors	SOIC-8
NCP3030	1200/2400	4.7	28	Down to 0.6	High switching frequency	SOIC-8
LV5068V	300-2200	4.5	40	Down to 1.26	90 µA light load current consumption	SSOP-16
TL594	40-300	7	40	External Adj.	Buck, boost, forward, flyback	SOIC-16, PDIP-16
LV5747QA	385	8	42	Down to 0.7	Current mode buck; fixed frequency; soft start; EN	VQFN-16J
LV5749NV	80-500	8.5	42	Down to 0.67	Current mode buck; double OCP function; variable frequency; soft start; EN	SSOP-16
LV5769V	80-500	8.5	42	Down to 0.67	Current mode buck; variable frequency; soft start; EN	SSOP-16
LV5762QA	1000	8	42	Down to 0.7	Current mode buck; fixed high frequency; soft start; EN	VQFN-16J
LV5725JA	50-500	4.5	50	Down to 0.7	Current mode buck; soft start; hiccup; programmable current limit; SYNC; PGOOD	SSOP-16
CS5124	400	7.7	75	External Adj.	Small PCB footprint; isolated	SOIC-8
NCP1034	Up to 500	8	100	Down to 1.25	2 A drive capability; synchronization	SOIC-16
NCP1030	300	10	200	2.5 up to Vin	PoE applications; integrated switch	Micro8™
NCP1031	300	10	200	2.5 up to Vin	PoE applications; integrated switch	SOIC-8, DFN-8

Linear and Switching Regulators

Linear & Switching Regulators for Current of <1 A

Type	Device	I_{out} (mA)	Dropout Typ @ 3.3 V (mV)	PSRR @ 120 Hz (dB)	V_{in} Max (V)	V_{out} (V)	Package
Linear Regulators	NCP508	50	180	70	13	1.5, 1.8, 2.5, 2.8, 3.0, 3.3	SC-70-5, WDFN-6
	NCP600	150	75	62	6	Adj., 1.3, 1.5, 1.8, 2.8, 3.0, 3.3, 3.5, 5.0	TSOP-5, DFN-6
	NCP698	150	200	25	6	1.3, 1.5, 1.8, 2.5, 2.8, 3.0, 3.3, 5.0	SC-70-4
	NCP699	150	320	55	6	1.3, 1.5, 1.8, 2.5, 2.8, 3.0, 3.1, 3.3, 5.0	TSOP-5
	NCP571	150	450	-	12	0.8, 0.9, 1.0, 1.2	TSOP-5, DFN-6
	NCP700B	200	118	82	5.5	1.8, 2.8, 3.0, 3.3	WDFN-6, TSOP-5
	NCP702	200	140	68	6	1.8, 2.8, 3.0, 3.3	XDFN-6, TSOP-5
	CAT6218	300	180	64	5.5	1.8, 2.8, 3.2	TSOT-23
	NCP603	300	100	62	6	Adj., 1.3, 1.5, 1.8, 2.8, 3.0, 3.3, 3.5, 5.0	TSOP-5
	NCP703	300	180	68	6	1.8, 2.8, 3.0, 3.3	XDFN-6, TSOP-5
	NCP605	500	170	62	6	Adj., 1.5, 1.8, 2.5, 2.8, 3.0, 3.3, 5.0	DFN-6
	NCP606	500	170	62	6	Adj., 1.5, 1.8, 2.5, 2.8, 3.0, 3.3, 5.0	DFN-6
	NCP3335A	500	250	75	18	Adj., 1.5, 1.8, 2.5, 2.8, 2.85, 3.0, 3.3, 5.0	Micro8, DFN-10
	NCP3334	500	250	75	18	Adj.	SOIC-8
	CAT6219	500	300	64	5.5	Adj., 1.8, 2.8, 3.3	TSOT-23
	NCP5500	500	230	75	18	Adj., 1.5, 5.0	DPAK-5, SOIC-8

Type	Device	I_{out} (mA)	f_{SW} (kHz)	V_{in} Min (V)	V_{in} Max (V)	Comments	Package
Switching Regulators	LM2594	500	150	4.5	40	No external compensation required	SOIC-8, PDIP-8
	LA5735MC	600	300	4.5	32	No external compensation	SOIC-8
	LA5724MC	600	160	4.5	28	No external compensation	SOIC-8
	NCP1521B	600	1500	2.7	5.5	Auto PWM/PFM mode; Sync rectification	SOT-23-5
	NCP1522B	600	3000	2.7	5.5	Auto PWM/PFM mode; Sync rectification	SOT-23-5
	NCP1523B	600	3000	2.7	5.5	PWM mode; Sync rectification	Flip-Chip-8
	NCP6914	800	3000	2.3	5.5	Integrates single 0.8 A switching regulator and four 0.15/0.30 a linear regulators	WLCSP-20

Switching Regulator for Current of >5 A

Type	Device	Iout (A)	f_{SW} (kHz)	Vin Min (V)	Vin Max (V)	Comments	Package
Switching Regulator	MC34167	5.0	72	7	40	Standby mode <36 µA	D2PAK, TO-220

Linear and Switching Regulators (cont.)

Linear & Switching Regulators for Current of 1-5 A

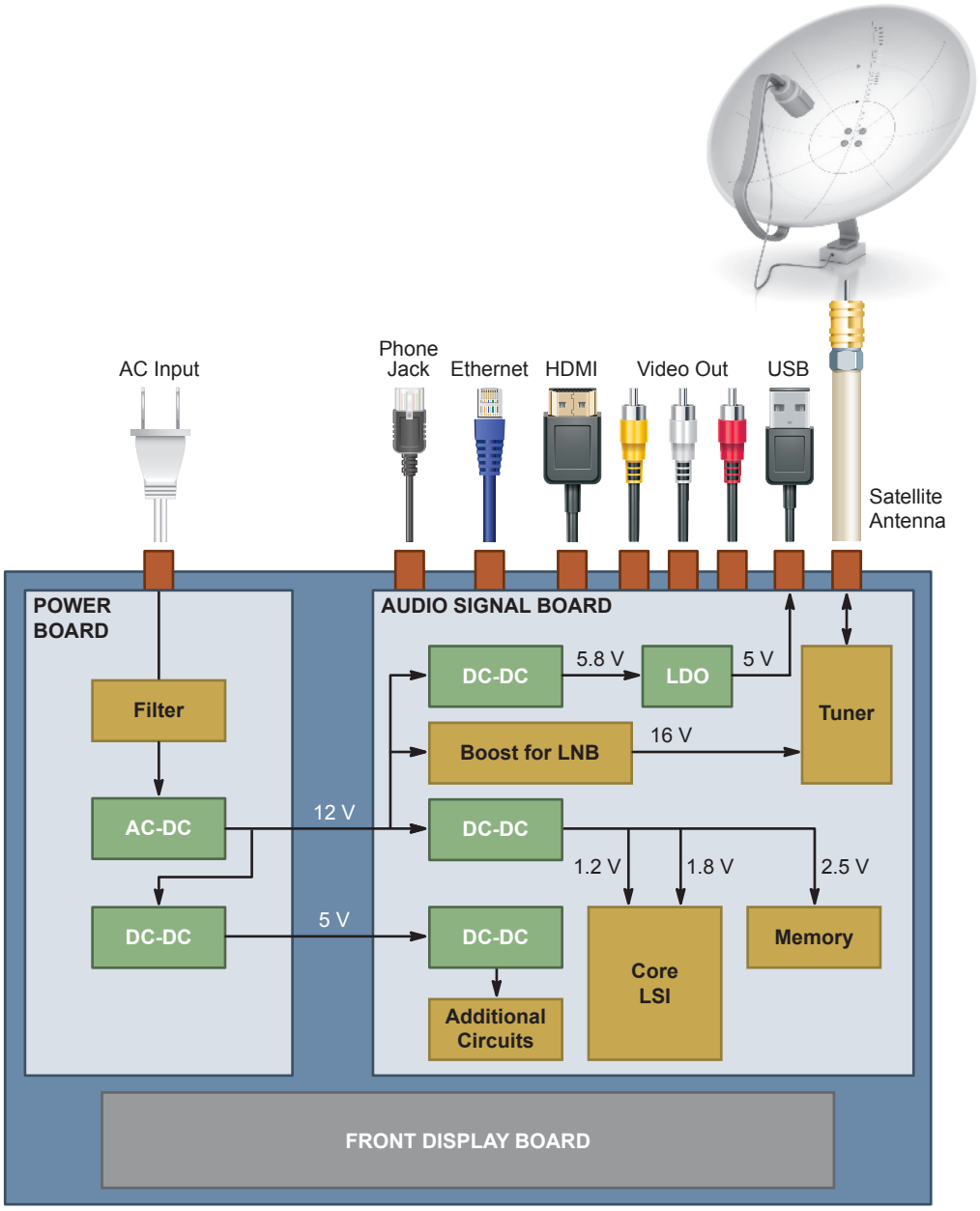
Type	Device	I_{out} (A)	Dropout Typ @ 3.3 V (mV)	PSRR @ 120 Hz (dB)	V_{in} Max (V)	V_{out} (V)	Package
Linear Regulators	NCP1117	1.0	1.2	64	20	Adj., 1.5, 1.8, 1.9, 2.0, 2.5, 2.85, 3.3, 5.0, 12	DPAK-3, SOT-223
	NCP690/1/2	1.0	0.18	62	6.5	Adj., 1.5, 1.8, 2.5, 3.3, 5.0	DFN-6
	NCP693	1.0	0.17	70	7.0	0.8, 1.0, 1.2, 2.5, 3.3	DFN-6
	NCP694	1.0	0.1	70	6.5	0.8, 1.0, 1.2, 2.5, 3.3	SOT-89-5, HSON-6
	NCP5661	1.0	1.0	70	18	Adj., 1.2, 1.5, 1.8, 2.5, 2.8, 3.0, 3.3	DPAK-5, DFN-6
	NCP565	1.5	0.9	85	18	Adj., 1.2, 1.5, 2.8, 3.0, 3.3	D2PAK-3/5, SOT-223, DFN-6
	NCP566	1.5	0.9	85	18	1.2, 1.8, 2.5	SOT-223
	NCP59151	1.5	0.3	60	13.6	1.8, 2.5, 2.8, 3.0, 3.3, 5.0	D2PAK-5, DFN-8
	NCP59152	1.5	0.3	60	13.6	Adj	D2PAK-5, DFN-8
	NCP5662	2.0	1.0	70	18	Adj., 1.2, 1.5, 1.8, 2.5, 2.8, 3.0, 3.3	D2PAK-5, DFN-8
	NCP5663	3.0	1.0	70	18	Adj., 1.5, 1.8	D2PAK-5
	NCP59301	3.0	0.3	60	18	1.8, 2.5, 2.8, 3.0, 3.3, 5.0	D2PAK-5, DFN-8
	NCP59302	3.0	0.3	60	18	Adj	D2PAK-5, DFN-8

Type	Device	I_{out} (A)	f_{SW} (kHz)	V_{in} Min (V)	V_{in} Max (V)	Comments	Package
Switching Regulators	LM2595	1.0	150	4.5	40	No external compensation	D2PAK, TO-220
	NCP1529	1.0	1700	2.7	5.5	Auto PWM/PFM mode; Sync rectification	SOT-23-5, DFN-6
	CS5141x	1.5	260/520	4.5	40	Sync capability; Pin-compatible w/LT1375/6	SOIC-8, DFN-8
	NCP1547	1.5	340	4.5	40	1 µA Iq; Synchronization	SOIC-8, DFN-18
	NCP1595A	1.5	1200	4	5.5	Internal compensation; Sync rectification	DFN-6
	LA5744TP	1.5	300	4.5	28	Soft start; No external compensation	TP5HFA
	LA5757TP	1.5	300	4.5	32	Soft start; No external compensation	TP5HFA
	MC34063	1.5	Up to 100	3	40	Minimal number of external components	SOIC-8, PDIP-8
	NCP3063	1.5	Up to 250	3	40	High Fsw for optimized size & efficiency	DFN-8, SOIC-8, PDIP-8
	NCP3064	1.5	Up to 250	3	40	High Fsw for optimized size & efficiency; Enable	DFN-8, SOIC-8, PDIP-8
	NCP1597	2.0	1200	4.0	5.5	Internal compensation	DFN-6
	NCP6334	2.0	3000	2.3	5.5	PG; Auto PWM/PFM; Sync rectification; Internal compensation	WDFN-8
	LM2596	3.0	150	4.5	40	No external compensation	D2PAK, TO-220
	LA5774	3.0	160	4.5	28	Soft start; No external compensation	TO-220-5H
	LA5779	3.0	160	4.5	28	Enable; No external compensation	TO-220-5H
	LA5744	3.0	300	4.5	28	Soft start; No external compensation	TO-220-5HK
	LV5980MC	3.0	370	4.5	23	High efficiency from light load to heavy load; Isleep = 63 µA	SOIC-8
	NCP3170	3.0	500/1000	4.5	18	Light load efficiency; PG; EN	SOIC-8
	NCP1593	3.0	1200	2.7	5.5	Internal compensation; PG; EN	DFN-10
	NCP3163	3.4	Up to 300	2.5	40	High Fsw for optimized size & efficiency	DFN-18, SOIC-16
	NCP3125	4.0	350	4.5	13.2	High efficiency	SOIC-8

Boost for Satellite LNB

Boost Converters for Satellite LNB

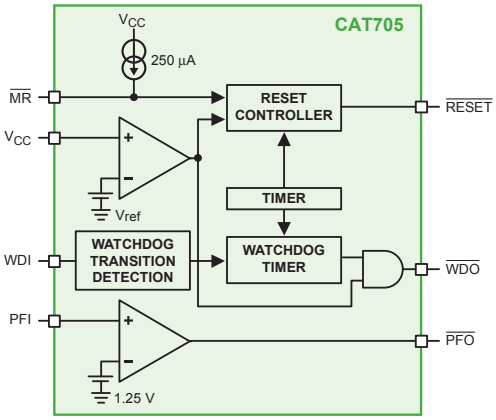
Device	fsw (kHz)	Vin Min (V)	Vin Max (V)	Vout (V)	Comments	Package
LV56351JA/HA	425	8	23	set by resistor	Boost plus LDO for satellite LNB; programmable output; short circuit protection	SSOP-20, HSSOP-14
LV5636VH	1000	8	23	15.9/11.7	Boost plus LDO for satellite LNB; fixed output; short circuit protection	HSSOP-14



Voltage Supervisors

Key Features

- Lowest quiescent current for extended battery life
- Large number of voltage thresholds
- Wide operating voltage, up to 10 V



Voltage Supervisors

Device	Channels	Vcc Min (V)	Vcc Max (V)	Icc Typ (µA)	RAH[1]	RAL[2]	Threshold Levels (V)	Package
CAT885	5	1.5	5.5	3		✔	1.68, 2.33, 2.87, 2.95, 4.63, + 3x Adj (0.60 V min)	MSOP−8, SOIC−8
CAT8710	4	1.5	5.5	3		✔	1.67, 2.32, 2.78, 3.08 + 2x Adj (0.62 V min)	SOT-23−6
CAT705/6	2	1.2	5.5	6		✔	4.40 / 1.25, 4.65 / 1.25	SOIC−8
CAT813	2	1.2	5.5	6	✔		4.65 / 1.25	SOIC−8
MC33161, MC34161	2	2	40	450	✔	✔	1.27	Micro8™, SOIC-8, PDIP-8
CAT808	1	1.2	6.0	3.5		✔	2.7, 3.2, 3.5	TSOT-23−5
CAT811	1	1	5.5	6		✔	2.32, 2.63, 2.93, 3.08, 4.0, 4.38, 4.63	SOT-143−4
CAT812	1	1	5.5	6	✔		2.32, 2.63, 2.93, 3.08, 4.0, 4.38, 4.64	SOT-143−4
CAT823/4/5	1	1	5.5	4	✔	✔	2.19, 2.32, 2.63, 2.93, 3.08, 4.0, 4.38, 4.63	TSOT-23−5, SC-70−5
CAT853/63/69	1	1	5.5	6		✔	2.40, 2.93, 3.08, 4.38	SOT-23−3
CAT1232LP	1	1	5.5	35	✔	✔	4.37, 4.62	PDIP−8, MSOP−8, SOIC−8, SOIC−16
CAT1832	1	1	5.5	35	✔	✔	2.55, 2.88	PDIP−8, MSOP−8, SOIC−8
MAX708	1	1	5.5	12	✔	✔	2.63, 2.93, 3.08, 4.38	Micro8, SOIC-8
MAX803 [3]	1	1	5.5	0.5		✔	1.2, 1.6, 2.32, 2.63, 2.93, 3.08, 4.0, 4.38, 4.63	SC-70−3, SOT-23−3
MAX809 [4]	1	1	5.5	0.5		✔	1.2, 1.6, 2.32, 2.63, 2.93, 3.08, 4.0, 4.38, 4.55, 4.63, 4.9	SC-70−3, SOT-23−3
MAX810 [5]	1	1	5.5	0.5	✔		1.2, 2.63, 2.93, 3.08, 4.38, 4.63	SC-70−3, SOT-23−3
MC33064, MC34064	1	1	6.5	9		✔	4.59	Micro8, SOIC-8, TSOP-5, TO-92
MC33164, MC34164	1	1	10	9		✔	2.65, 4.27	Micro8, SOIC-8, TSOP-5, TO-92
NCP300/1	1	0.8	10	0.2	✔	✔	0.9, 1.0, 1.2, 1.6, 1.8, 1.85, 2.0, 2.2, 2.5, 2.6, 2.7, 2.8, 3.0, 3.1, 3.2, 3.3, 3.4, 3.6, 3.9, 4.0, 4.2, 4.4, 4.5, 4.6, 4.7	TSOP-5
NCP302	1	0.8	10	0.2	✔	✔	0.9, 1.5, 1.8, 2.0, 2.7, 3.0, 3.3, 3.8, 4.0, 4.3, 4.5, 4.7	TSOP-5
NCP303	1	0.8	10	0.2		✔	0.9, 1.0, 1.1, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 2.0, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 3.0, 3.1, 3.2, 3.3, 3.4, 3.6, 3.8, 4.0, 4.2, 4.5, 4.6, 4.7, 4.9	TSOP-5
NCP304	1	0.8	10	0.8	✔	✔	0.9, 1.5, 1.8, 2.0, 2.2, 2.3, 2.5, 2.7, 2.9, 3.0, 3.3, 3.7, 3.8, 4.0, 4.2, 4.3, 4.5, 4.6, 4.7, 4.9	SC-70-4
NCP305	1	0.8	10	0.8		✔	0.9, 1.1, 1.5, 1.6, 1.7, 1.8, 2.0, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 3.0, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 4.0, 4.4, 4.5, 4.7, 4.9	SC-70-4

1. Reset Active High 2. Reset Active Low 3. See CAT803, MAX803, NCP803 4. See CAT809, MAX809 5. See CAT810, MAX810

Rectifiers for Primary-Side, Secondary-Side, and Point-of-Load Rectification

Input/Primary Rectification

Family	Vbr (V)	Io (A)	Packages	Example Device
Ultrafast	400	1-15	Axial, TO-220, FullPack	MUR840
Ultrafast	520	5	Axial, TO-220	MUR550
Planar Ultrafast	600	8, 15	TO-220, FullPack	NHPV08S600, NHPV15S600
Ultrafast	800	1-4	Axial	MUR480E

Output/Secondary Rectification

Family	Vbr (V)	Io (A)	Packages	Example Device
Schottky	30-45	1-60	TO-220, I2PAK, FullPack	MBR1045, MBR1545CT, MBR2545CT
Schottky	60-100	10-60	TO-220, I2PAK, FullPack	MBRF10L60CT, MBR40L60CT, MBR30H100CT
Schottky	150	10-30	TO-220, FullPack	MBRF10H150CT, MBRF20H150CT, MBRF30H150CT
Schottky	100	5	SO-8 Flat Lead	MBR5H100MFS
Trench Schottky	80	20-30	TO-220, FullPack	NTSV2080CT, NTSJ2080CT, NTSV20U80CT
Trench Schottky	100	20-30	TO-220, I2PAK, D2PAK, FullPack	NTSV20100CT, NTSB20U100CT, NTSJ30U100CT
Trench Schottky	120	20-40	TO-220, I2PAK, D2PAK, FullPack	NTSV20120CT, NTSJ30120CT, NTSB40120CT

Point-of-Load Rectification

Family	Vbr (V)	Io (A)	Packages	Example Device
Schottky	10-30	1-10	SMA, SMB, SMC, DPAK, POWERMITE®	MBRS410L, MBRA320
Trench Schottky/ Schottky	30-45	1-30	SMA, SMA FL, SMB, SMC, DPAK, POWERMITE, SOD-123FL, SO-8FL	MBRD1035CTL, MBRAF440, MBR140E, MBR2045, NTS1545*

* Pending 1Q14.

Voltage References

Voltage References

Device	Type	Tolerance	Reference Voltage (V)	Operating Current (mA)	Package
CAT102	Adjustable	1%	2.2 - 18	0.1 - 20	TSOT-23-5
NCP431	Adjustable	1%	2.5 - 36	40 µA	SOIC-8, TO-92, SOT-23
TL431	Adjustable	2.2%	2.5 - 36	1 - 100	SOIC-8, PDIP-8, Micro8, TO-92
TL431A	Adjustable	1%	2.5 - 36	1 - 100	SOIC-8, PDIP-8, Micro8, TO-92
TL431B	Adjustable	0.4%	2.5 - 36	1 - 100	SOIC-8, PDIP-8, Micro8, TO-92
LM285	Fixed	1%, 1.5%	1.235	0.01 - 20	SOIC-8, TO-92
LM385	Fixed	1%, 1,5%, 2%, 3%	1.235	0.01 - 20	SOIC-8, TO-92
LM385B	Fixed	1%, 1.5%	1.235	0.01 - 20	SOIC-8, TO-92
NCP51460	Fixed	1%	3.3	0 - 20	SOT-23-5

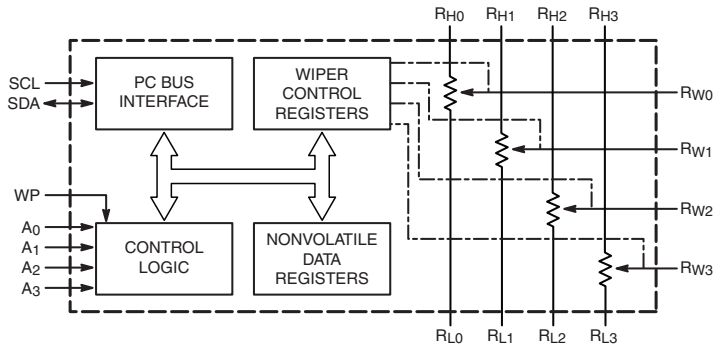
Key Features

- Tight voltage tolerances from 0.4% to 3%
- Output voltage range up to 36 V
- Low dynamic impedance, low noise and stable operation over time and temperature

Digitally Programmable Potentiometers for Trimming and Calibration

Key Features

- No drift over time or temperature
- No changes due to mechanical stress or shock
- Systems can be calibrated real-time, in the field
- Broad portfolio provides for selection of optimal number of pots and taps

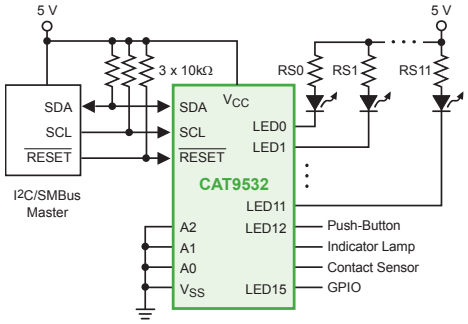


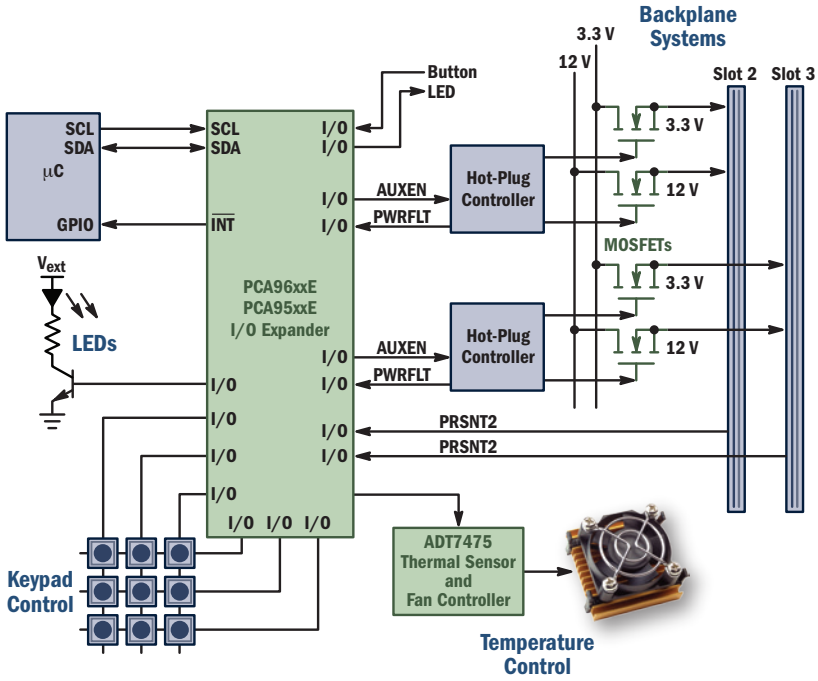
Device	Number of Pots	Number of Taps	Resistance (kΩ)	Buffered Wiper	Interface	Packages
CAT5120/1/2	1	16	10; 50	No	Up/Down	SC-70; SOT-23
CAT5110	1	32	10; 50; 100	No	Up/Down	SC-70; SOT-23
CAT5112	1	32	10; 50; 100	Yes	Up/Down	MSOP-8; PDIP-8; SOIC-8; TSSOP-8
CAT5114	1	32	10; 50; 100	Yes	Up/Down	MSOP-8; PDIP-8; SOIC-8; TDFN-8; TSSOP-8
CAT5115	1	32	10; 50; 100	No	Up/Down	MSOP-8; PDIP-8; SOIC-8; TSSOP-8
CAT5118/9	1	32	10; 50; 100	No	Up/Down	SC-70; SOT-23
CAT5123	1	32	10	No	Up/Down	SOT-23
CAT5124	1	32	50	No	Up/Down	SOT-23
CAT5125	1	32	10	No	Up/Down	SOT-23
CAT5126	1	32	10	OTP	Up/Down	MSOP-8; TDFN-8
CAT5127	1	32	10	Yes	Up/Down	MSOP-8
CAT5128	1	32	10; 50	No	Up/Down	SOT-23-8
CAT5111	1	100	10; 50; 100	Yes	Up/Down	MSOP-8; PDIP-8; SOIC-8; TSSOP-8
CAT5113	1	100	1; 10; 50; 100	Yes	Up/Down	MSOP-8; PDIP-8; SOIC-8; TSSOP-8
CAT5116	1	100	32	Yes	Up/Down	MSOP-8; PDIP-8; SOIC-8; TSSOP-8
CAT5132	1	128	10; 50; 100	Yes	I2C	MSOP-10
CAT5133	1	128	10	Yes	Up/Down	MSOP-10
CAT5136/7	1	128	50	No	I2C	SC-70
CAT5138	1	128	10	No	I2C	SC-70
CAT5140	1	256	50; 100	Yes	I2C	MSOP-8
CAT5171	1	256	50; 100	No	I2C	SOT-23-8
CAT5172	1	256	50	No	SPI	SOT-23-8
CAT5221	2	64	2.5; 10; 50; 100	Yes	I2C	SOIC-20W; TSSOP-20
CAT5411	2	64	2.5; 10; 50; 100	Yes	SPI	SOIC-24W; TSSOP-24
CAT5419	2	64	2.5; 10; 50; 100	Yes	I2C	SOIC-24W; TSSOP-24
CAT5261	2	256	50; 100	Yes	SPI	SOIC-24W; TSSOP-24
CAT5269	2	256	50; 100	Yes	I2C	SOIC-24W; TSSOP-24
CAT5271	2	256	50; 100	No	I2C	MSOP-10
CAT5273	2	256	50	No	I2C	MSOP-10
CAT5241	4	64	2.5; 10; 50; 100	Yes	I2C	SOIC-20W; TSSOP-20
CAT5401	4	64	2.5; 10; 50; 100	Yes	SPI	SOIC-24W; TSSOP-24
CAT5409	4	64	2.5; 10; 50; 100	Yes	I2C	SOIC-24W; TSSOP-24
CAT5251	4	256	50; 100	Yes	SPI	SOIC-24W; TSSOP-24
CAT5259	4	256	50; 100	Yes	I2C	SOIC-24W; TSSOP-24

Cascadable I/O Expanders

Key Features

- I2C and SMBus interfaces
- 1 MHz SCL clock frequency
- 30 mA SDA sink capability





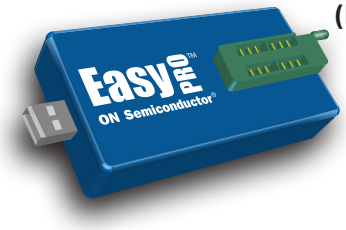
Device	I/O	Cascadable	Vcc Min (V)	Vcc Max (V)	Interrupt Output	I/O Pullups	LED Blink/ PWM	Package
PCA9535E	16	64 Programmable Slave Addresses	1.65	5.5	✔			QFN-24, SOIC-24, TSSOP-24
PCA9655E	16	64 Programmable Slave Addresses	1.65	5.5	✔			QFN-24, SOIC-24, TSSOP-24
CAT9532	16	8 Slave ID Addresses	2.3	5.5			✔	SOIC-24W, TQFN-24, TSSOP-24
CAT9552	16	8 Slave ID Addresses	2.3	5.5			✔	SOIC-24W, TQFN-24, TSSOP-24
CAT9555	16	8 Slave ID Addresses	2.3	5.5	✔	✔		SOIC-24W, TQFN-24,TSSOP-24
CAT9557	8	8 Slave ID Addresses	2.3	5.5			✔	SOIC-16, TQFN-16, TSSOP-16
CAT9534	8	8 Slave ID Addresses	2.3	5.5	✔			SOIC-16, TQFN-16, TSSOP-16
CAT9554	8	8 Slave ID Addresses	2.3	5.5	✔	✔		SOIC-16, TQFN-16, TSSOP-16
CAT9554A	8	8 Slave ID Addresses	2.3	5.5	✔	✔		SOIC-16, TQFN-16, TSSOP-16

EEPROMs for Configuration and Calibration

Features

- Broad density range: 1 kb to 2 Mb*
- Wide operating Vcc range: 1.8/1.7 V to 5.5 V
- High endurance: 1 million program/erase cycles
- Wide temperature range: industrial and extended

EasyPRO™ is a user-friendly, portable programming tool for ON Semiconductor serial EEPROMs (I²C, SPI, Microwire)

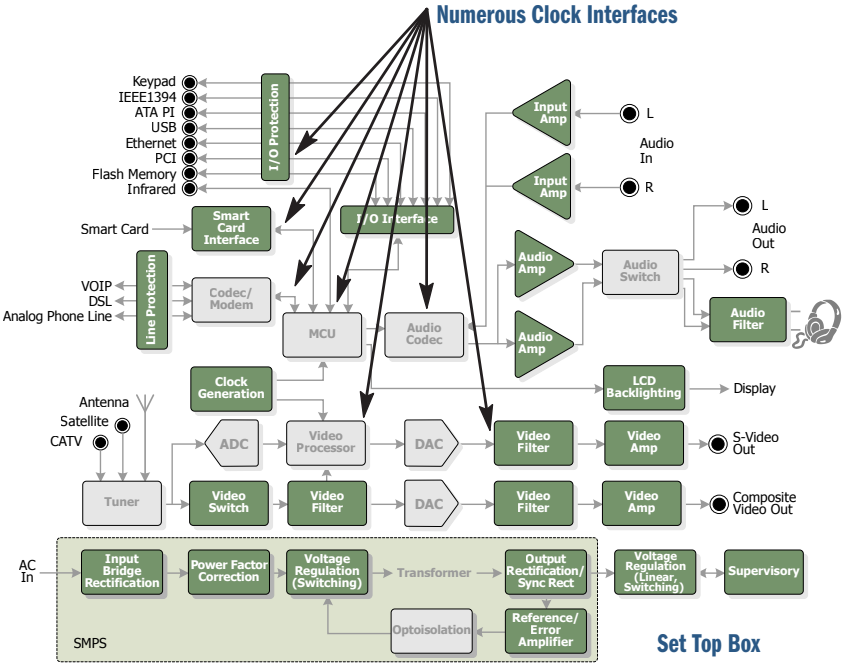


EEPROMs

Data Transmission Standard	Device	Density	Organization	Vcc Min (V)	Vcc Max (V)	Package(s)
I²C	CAT24M01	1 Mb	128k x 8	1.8	5.5	UDFN-8, TSSOP-8, SOIC-8, PDIP-8
	CAT24C512	512 kb	64k x 8	1.8	5.5	UDFN-8, TSSOP-8, SOIC-8, PDIP-8, MSOP-8
	CAT24C256	256 kb	32k x 8	1.8	5.5	UDFN-8, TSSOP-8, SOIC-8, PDIP-8, MSOP-8
	CAT24C128	128 kb	16k x 8	1.8	5.5	UDFN-8, TSSOP-8, SOIC-8, PDIP-8, MSOP-8
	CAT24C64	64 kb	8k x 8	1.7	5.5	UDFN-8, TSSOP-8, SOIC-8, PDIP-8, MSOP-8, TDFN-8
	CAT24C32	32 kb	4k x 8	1.7	5.5	UDFN-8, TSSOP-8, SOIC-8, PDIP-8, TSOP-5, TDFN-8
	CAT24C16	16 kb	2k x 8	1.7	5.5	UDFN-8, TSSOP-8, SOIC-8, PDIP-8, TDFN-8, MSOP-8, TSOT-23-5, WLCSP-4, WLCSP-5
	CAT24C08	8 kb	1k x 8	1.7	5.5	UDFN-8, TSSOP-8, SOIC-8, PDIP-8, TDFN-8, MSOP-8, TSOT-23-5, WLCSP-4, WLCSP-5
	CAT24C04	4 kb	512 x 8	1.7	5.5	UDFN-8, TSSOP-8, SOIC-8, PDIP-8, TDFN-8, MSOP-8, TSOT-23-5, WLCSP-4, WLSCP-5
	CAT24C02	2 kb	256 x 8	1.7	5.5	UDFN-8, TSSOP-8, SOIC-8, PDIP-8, TDFN-8, MSOP-8, TSOT-23-5
	CAT24C01	1 kb	128 x 8	1.7	5.5	TSSOP-8, SOIC-8, TDFN-8, MSOP-8, TSOT-23-5
SPI	CAT25M01	1 Mb	128k x 8	1.8	5.5	TSSOP-8, SOIC-8
	CAT25512	512 kb	64k x 8	1.8	5.5	UDFN-8, TSSOP-8, SOIC-8, PDIP-8
	CAT25256	256 kb	32k x 8	1.8	5.5	UDFN-8, TSSOP-8, SOIC-8, PDIP-8
	CAT25128	128 kb	16k x 8	1.8	5.5	UDFN-8, TSSOP-8, SOIC-8, PDIP-8, TDFN-8
	CAT25640	64 kb	8k x 8	1.8	5.5	UDFN-8, TSSOP-8, SOIC-8, PDIP-8, TDFN-8
	CAT25320	32 kb	4k x 8	1.8	5.5	UDFN-8, TSSOP-8, SOIC-8, PDIP-8, TDFN-8
	CAT25160	16 kb	2k x 8	1.8	5.5	UDFN-8, TSSOP-8, SOIC-8, PDIP-8, TDFN-8
	CAT25080	8 kb	1k x 8	1.8	5.5	UDFN-8, TSSOP-8, SOIC-8, PDIP-8, TDFN-8
	CAT25040	4 kb	512 x 8	1.8	5.5	UDFN-8, TSSOP-8, SOIC-8, PDIP-8, TDFN-8, MSOP-8
	CAT25020	2 kb	256 x 8	1.8	5.5	UDFN-8, TSSOP-8, SOIC-8, PDIP-8, TDFN-8, MSOP-8
	CAT25010	1 kb	128 x 8	1.8	5.5	UDFN-8, TSSOP-8, SOIC-8, PDIP-8, TDFN-8, MSOP-8
MicroWire	CAT93C86	16 kb	2k x 8	1.8	5.5	UDFN-8, TSSOP-8, SOIC-8, PDIP-8
	CAT93C76	8 kb	1k x 8	1.8	5.5	TSSOP-8, SOIC-8, PDIP-8
	CAT93C66	4 kb	512 x 8	1.8	5.5	TDFN-8, TSSOP-8, SOIC-8, PDIP-8
	CAT93C56	2 kb	256 x 8	1.8	5.5	TDFN-8, TSSOP-8, SOIC-8, PDIP-8
	CAT93C46/R	1 kb	128 x 8	1.8	5.5	TDFN-8, TSSOP-8, SOIC-8, PDIP-8

* Pending 4Q13.

Clock Generation and Distribution



Programmable PLL Clocks can satisfy all clock tree requirements in a single device

- Replace all clock interfaces with one Multi-PLL Programmable Clock
- Maintain clock architecture flexibility by being able to program new clock configurations through software
- Key devices
  - Clock Multiplier: NB3N3020
  - Single PLL I2C: FS7140, FS7145
  - Three PLL I2C EEPROM: FS6370, FS6377

3.3 V Clock Generators with Fixed Frequency Outputs

Device	Output Frequency (MHz)	Application	Package
ASM3P2854C	12, 33.33, 48, 66.66	USB, PCI, SDRAM, Processor	TSSOP-16
ASM3P2855D	19.52, 24, 50, 54.8	USB, Ethernet	TSSOP-16
PCS1P2192A	25, 27, 33.25, 40, 45, 65, 85, 108	Ethernet, PCI	SOIC-8
PCS1P2860A	25, 125, 127	Ethernet, Gigabit Ethernet	TSSOP-16
ASM3P2111B	48, 66	USB, PCI-e	SOIC-8
NB3N3002	25, 125, 200	PCI-e, Gigabit Ethernet	TSSOP-16
NB3N511	14-200 with selectable multiplier ratios	USB, PCI, PCI-e, SDRAM, Ethernet, Gigabit Ethernet, CPU	SOIC-8
NB3N501	13-160	CPU, USB, PCI, Network	SOIC-8
NB3N502	14-120	CPU, USB, PCI, Network, Ethernet	SOIC-8
NB3N51034*	100, 200	PCI-e, DIMM, CPU	TSSOP-20
NB3N5573	25, 100, 125, 200	PCI-e, DIMM, CPU	TSSOP-16
NB3N65027	27, 33.33, 66.66, 75, 83, 100, 125, 133	SDRAM, SATA, Ethernet, CPU, Video	QSOP-20
NBVSPA027	148.5	SD/HD Clock	CLCC-6
NBVSPA042	74.25	SD/HD Clock	CLCC-6

* Pending 1Q14.

Clock Buffers

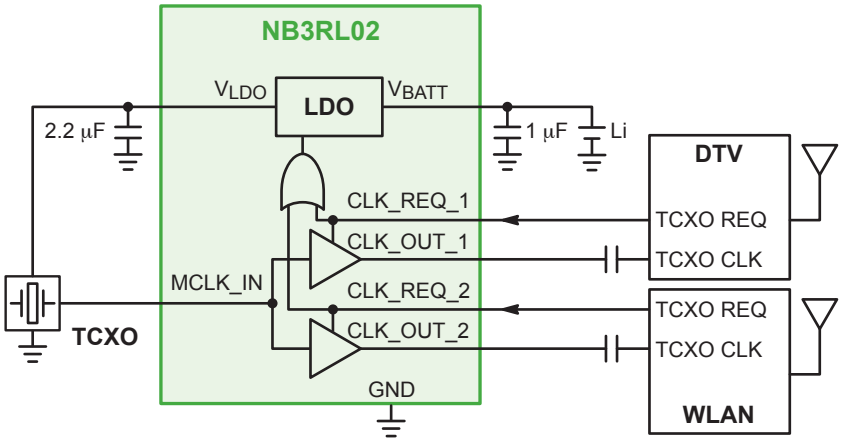
Device	VCC (V)	Output Freq (MHz)	Outputs	Type	Package
NB3N551	3.3, 5.0	180	4	Fanout Buffer	SOIC-8, DFN-8
NB3L553	2.5, 3.3, 5.0	200	4	Fanout Buffer	SOIC-8, DFN-8
NB3N2304NZ	3.3	140	4	Low Skew Fanout Buffer	TSSOP-8, DFN-8
P2P2305NZ	3.3	133	5	Clock Fanout Buffer	SOIC-8
PCS2P2309NZ	3.3	133	9	Clock Fanout Buffer	SOIC-16
NB2305A	3.3	15-133	5	Zero Delay Buffer	TSSOP-8, SOIC-8
NB2309A	3.3	15-133	9	Zero Delay Buffer	TSSOP-16, SOIC-16
NB2304A	3.3	15-133	4	Zero Delay Buffer	SOIC-8
NB2308A	3.3	15-133	8	Zero Delay Buffer	TSSOP-16, SOIC-16
NB3N2302	3.3, 5.0	5-133	2	Zero Delay Buffer	SOIC-8

Low Noise Clock Buffers

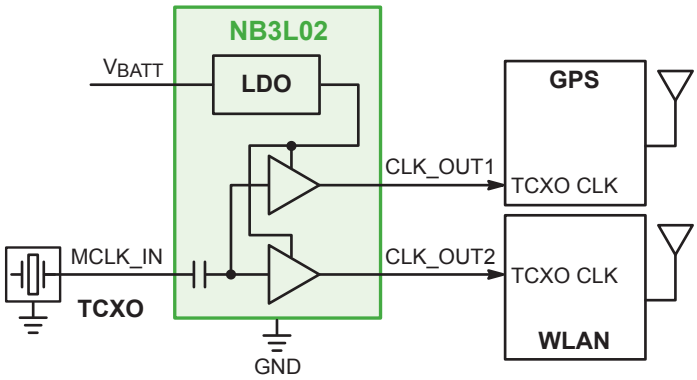
NB3RL02 Key Features

- Low additive noise: −149 dBc/Hz at 10 kHz offset phase noise
- 0.37 ps (rms) output jitter
- Limited output slew rate for EMI reduction (1 to 5 ns rise/fall time for 10−50 pF loads)
- Regulated 1.8 V externally available I/O supply
- ESD performance exceeds JESD 22
  - 2000 V Human−Body Model (A114−A)
  - 200 V Machine Model (A115−A)
  - 1000 V Charged−Device Model (JESD22−C101−A Level III)
- WLCSP-8 package

NB3RL02 has two CMOS outputs with clock request lines. Systems in need of TCXO clock will request clock from NB3RL02, and NB3RL02 powers the TCXO and delivers the requested clock.



NB3RL02 Reduces Cost by Eliminating Multiple TCXOs

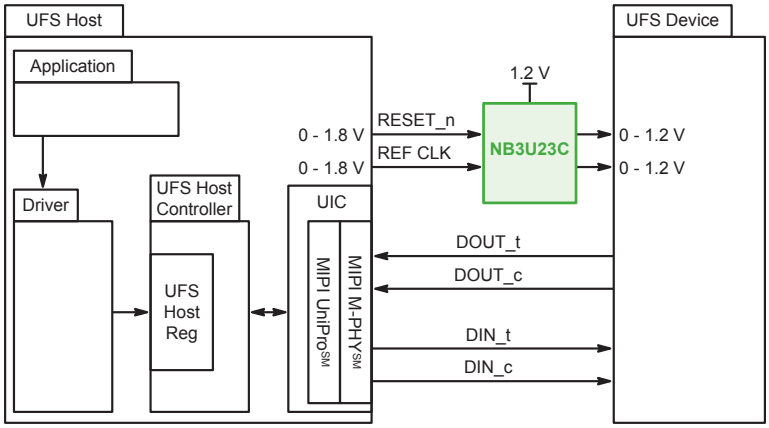


NB3L02 Key Features

- 1:2 Fanout
- Low phase noise TCXO buffer
- AC coupled input accepts sin wave or square wave
- WLCSP-6 package

NB3U23C Key Features

- Low phase noise
- Low standby current
- Dual input, dual output voltage translator/buffer
- Targeted for Universal Flash Storage (UFS) applications
- SC-70-6 package

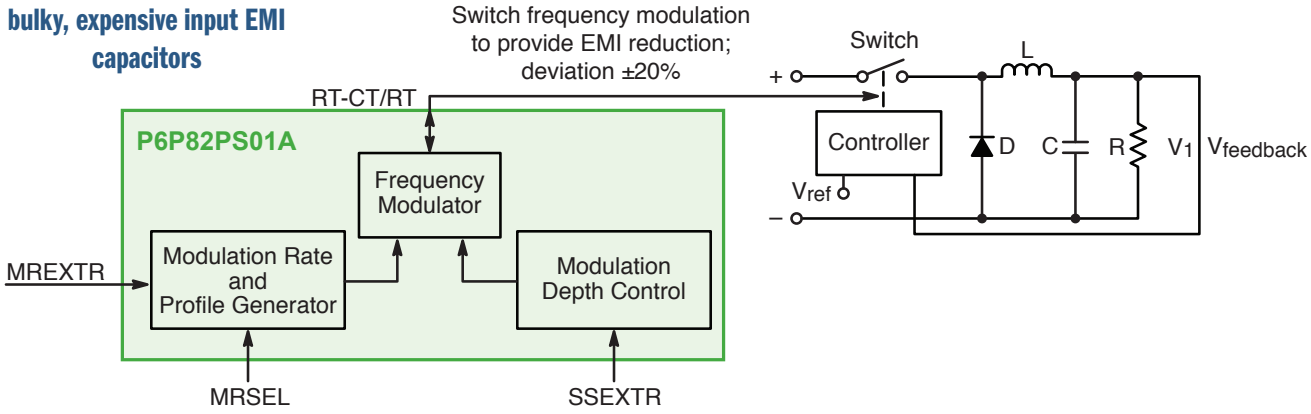


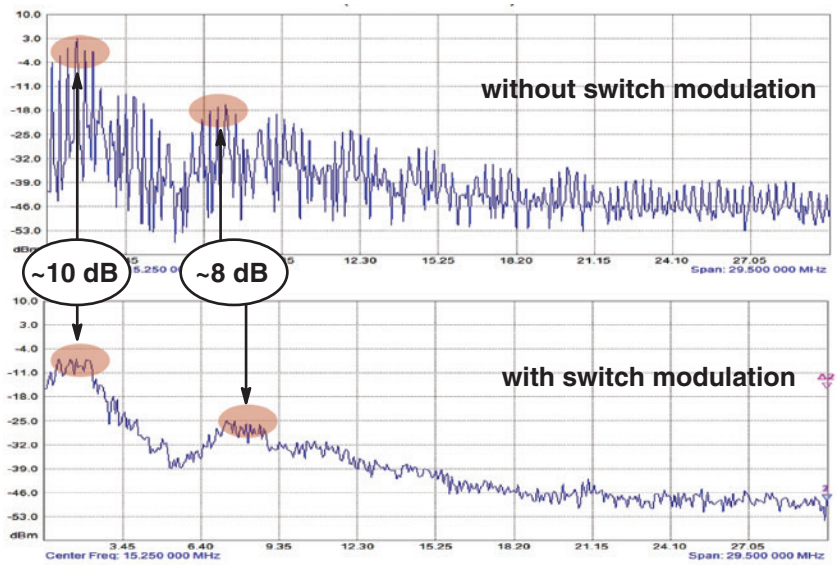
P6P82PS01A Suppresses EMI as Companion to PWM Controller

P6P82PS01A Key Features

- Companion device can be seamlessly integrated into existing converter designs
- Modulates impedance of existing RT or RT/CT node on PWM controller to reduce EMI
- User selectable control for critical spread spectrum parameters, like deviation and modulation rate, achieves optimal EMI reduction; flexible control ensures no impact on key performance metrics, such as voltage ripple and efficiency
- EMI reduction from 4 to 10 dB achievable across the spectrum, at fundamental as well as harmonics

Reduces or eliminates bulky, expensive input EMI capacitors

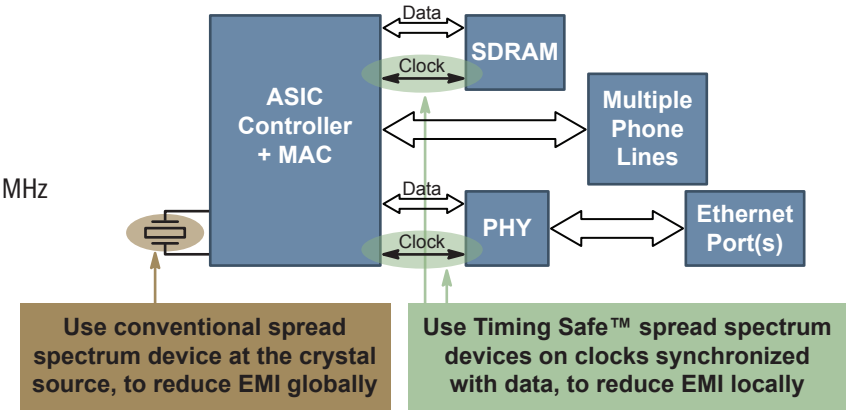


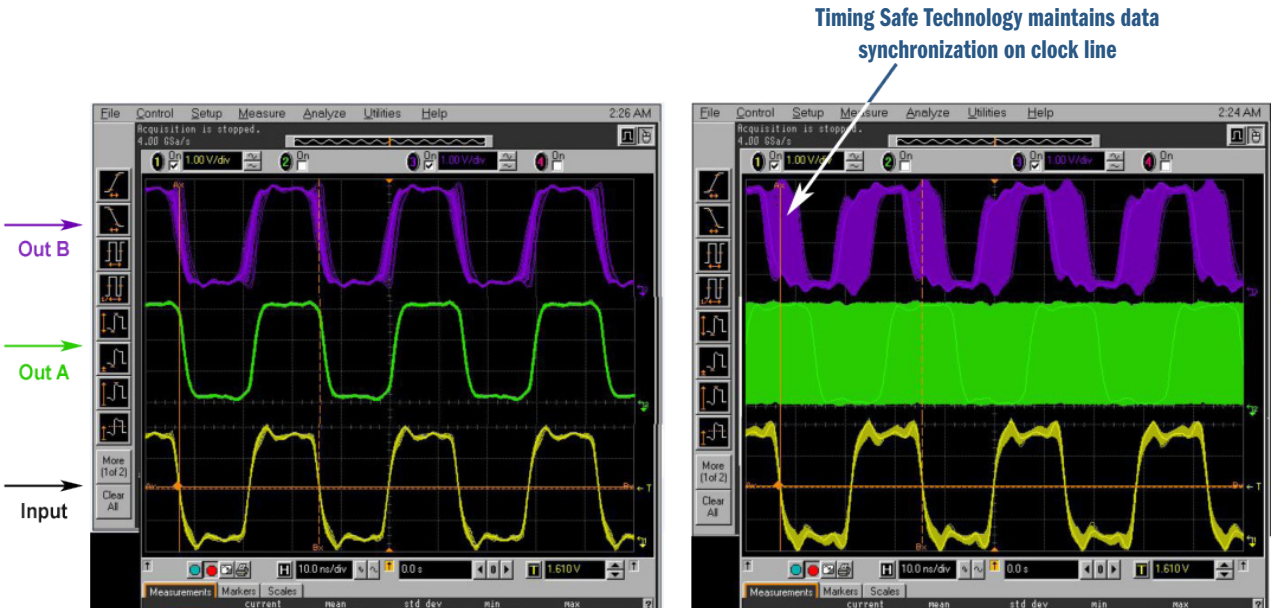


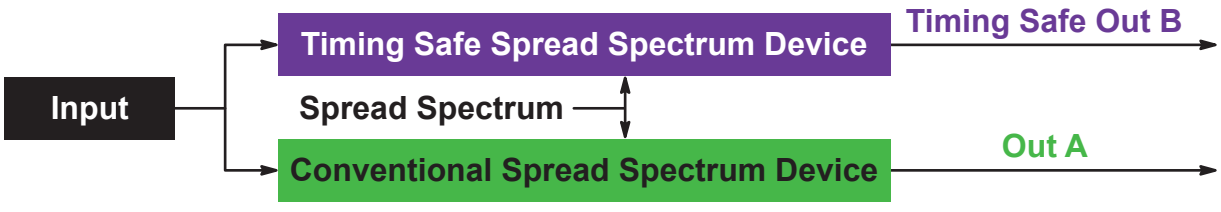
Active EMI Solution for MII Interface in Ethernet Applications

P3P85R01A Key Features

- 1x, LVCMOS peak EMI reduction
- Input frequency range: 75 - 200 MHz
- Output frequency range: 75 - 200 MHz
- PLL bypass mode frequency range: 100 Hz - 200 MHz
- Analog deviation selection
- Analog input-output delay control
- Analog PLL output delay control
- 3.3 V supply voltage
- 0°C to +70°C operating temperature range
- WDFN-8, 2 mm x 2 mm package





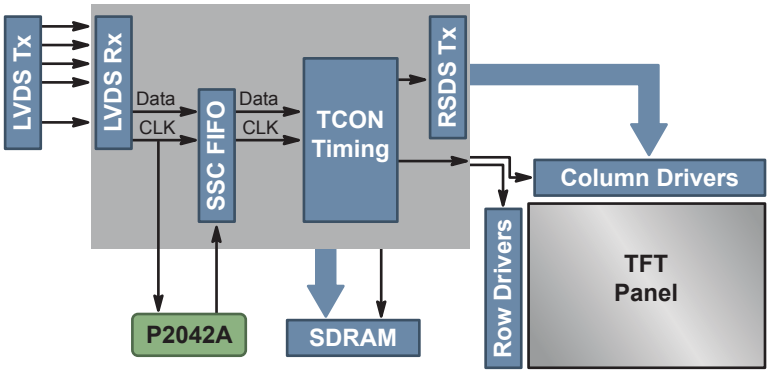


Active EMI Suppression Using Spread Spectrum

P2042A Key Features

- Provides up to 15 dB of EMI suppression
- Generates a 1x low EMI spread spectrum clock output
- 30 – 110 MHz input/output frequency ranges
- Optimized for 32.5, 54, 65, 74 and 108 MHz pixel clock frequencies
- Internal loop filter minimizes external components and board space
- Eight selectable high spread ranges up to ±2%
- Selectable center spread options
- SSON# control pin for spread spectrum enable and disable options
- 3.3 ± 0.3 V operating range
- Supports most mobile graphic accelerator and LCD timing controller specifications
- TSSOP-8 package

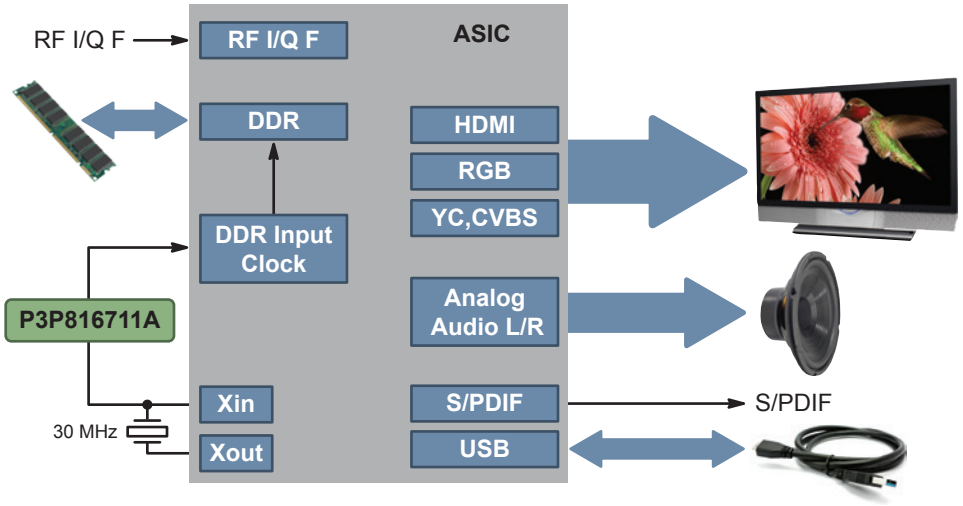
P2042A generates a spread spectrum clock that spreads the clock & data equally to suppress EMI on the SDRAM interface



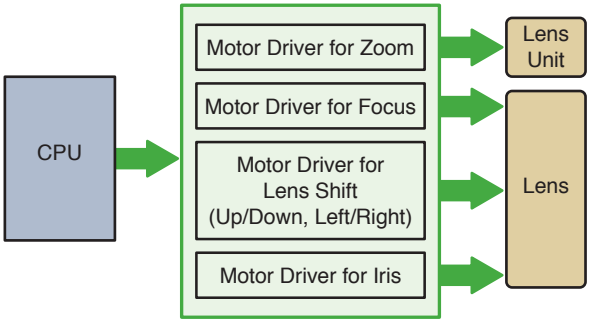
DDR EMI Suppression for Set Top Boxes

P3P816711A Key Features

- 1x LVCMOS Peak EMI Reduction
- 30 MHz input reference clock
- 30 MHz ± 0.3% output clock
- Vdd = 3.3 V ± 10%
- -40 to +85 °C operating temperature
- TSOP-6 package



Motor Drivers for Small Motor Control



Key Features

- Integrated active flyback protection
- Thermal and UVLO fault detection
- Over-current fault detection on LV8711T

Device	Type	VM Max (V)	VCC Max (V)	IO Max (A)	IO Peak Max (A)	Step Resolution	Control Type	Current Sense	Regulator Output	Package
LV8400V	Brush DC	16	6	1.2	3.8	–	Parallel	None	No	SSOP-16
LV8711T	Stepper/Brush DC	18	6	0.8	1	1/2	Parallel	External Resistor	Yes	TSSOP-24
LV8712T	Stepper	18	6	0.8	1	1/8	Clock	External Resistor	Yes	TSSOP-24
LV8713T	Stepper	18	6	0.8	1	1/32	Clock	External Resistor	Yes	TSSOP-24

General and LCD MCUs

MCU Features

- Pins: 10 – 100
- ROM: 4 – 512 KBytes
- RAM: 256 – 24,576 Bytes
- ADC: 3 – 16 channels
- Operation Voltage: 1.8 – 5.5 (V)
- Stand-by IDD: 0.02 µA
- RTC (Clock) IDD: 0.45 µA (with low power model)

Device	Type	ROM (kByte)	RAM (Byte)	I/Os	PWMs	UARTs	ADC	LVD	POR	Features	Package
LC87FBG08A	8-bit General	8	256	21	2	1	12/8-bit x 8ch	✔	✔	High accuracy internal OSC (±2.0%); all operation is minimum 1.8 V	SSOP-24
LC87FBK08A	8-bit General	8	256	21	2	–	12/8-bit x 8ch	✔	✔	High accuracy internal OSC (±3.0%)	SSOP-24
LC87FBL08A*	8-bit General	8	256	26	2	–	12/8-bit x 11ch	✔	✔	High accuracy internal OSC (±3.0%)	QFP-36
LC87F2R04A	8-bit General	4.5	128	21	2	–	12/8-bit x 8ch	✔	✔	Timer; SIO; Remote Control Receiver Circuit	SSOP-24
LC87BK08A*	8-bit General	8**	256	21	2	–	12/8-bit x 8ch	✔	✔	Mask ROM edition of LC87FBK08A	SSOP-24
LC87BL08A*	8-bit General	8**	256	26	2	–	12/8-bit x 11ch	✔	✔	Mask ROM edition of LC87FBL08A	QFP-36
LC87F2J32A	8-bit General	32	1024	41	2	1	12/8-bit x 14ch	✔	✔	Premium market segment	SQFP-48
LC87F2W48A	8-bit General	50	1536	40	2	1	12/8-bit x 14ch	✔	–	Premium market segment	SQFP-48
LC87F2C64A	8-bit General	64	2048	73	4	2	12/8-bit x 16ch	✔	✔	RTC; low power consumption	QFP-80
LC87FC096A	8-bit General	96	4096	54	6	3	12/8-bit x 11ch	✔	✔	SIO; Timer; PWM; Remote Control Receiver Circuit	QIP-64
LC87F2608A	8-bit General	8	512	11	2	–	12/8-bit x 3ch	✔	✔	High speed 12-bit PWM; Analog Comparator	MFP-10S
LC87F0808A	8-bit General	8	256	28	2	1	12/8-bit x 8ch	✔	✔	MCPWM; High speed ADC (10-bit); Analog Comparator/Amplifier x 2	QFP-36
LC87F0N04A	8-bit General	4.5	128	12	2	–	10/8-bit x 6ch	✔	✔	MCPWM; High speed ADC (10-bit); Analog Comparator x 2	SSOP-16
LC87F5VP6A	8-bit General	256	10240	88	4	2	8-bit x 15ch	–	–	Large scale memory	TQFP-100
LC88F58B0A	16-bit General	128	6144	54	2	2	12/8-bit x 11ch	–	✔	PWM; SIO x 2; UART x 2; USM	SQFP-64
LC88F52H0A	16-bit General	512	24576	90	4	4	12/8-bit x 16ch	–	✔	PWM; RTC; SIO x 5; UART x 4	TQFP-100
LC87F7932B	8-bit LCD	32	2048	49	2	1	12/8-bit x 7ch	–	✔	32 x 4 segment driver; RTC; low power consumption	SQFP-64
LC87F7J32A	8-bit LCD	32	1024	50	2	1	12/8-bit x 12ch	✔	✔	24 x 4 segment driver; support 5 V/3 V for LCD-panel	TQFP-64
LC87F76C8A	8-bit LCD	128	4096	71	2	1	12-bit x 12ch	–	–	32 x 4 segment driver	QFP-80
LC87F7DC8A	8-bit LCD	128	4096	90	2	2	12-bit x 15ch	–	–	54 x 4 segment driver; many segment drivers	TQFP-100
LC877G16A	8-bit LCD	16**	512	22	–	1	–	–	–	74 x 4 segment driver; many segment drivers	TQFP-100

* Pending release. ** Mask Type.

MCUs for USB

MCU Features

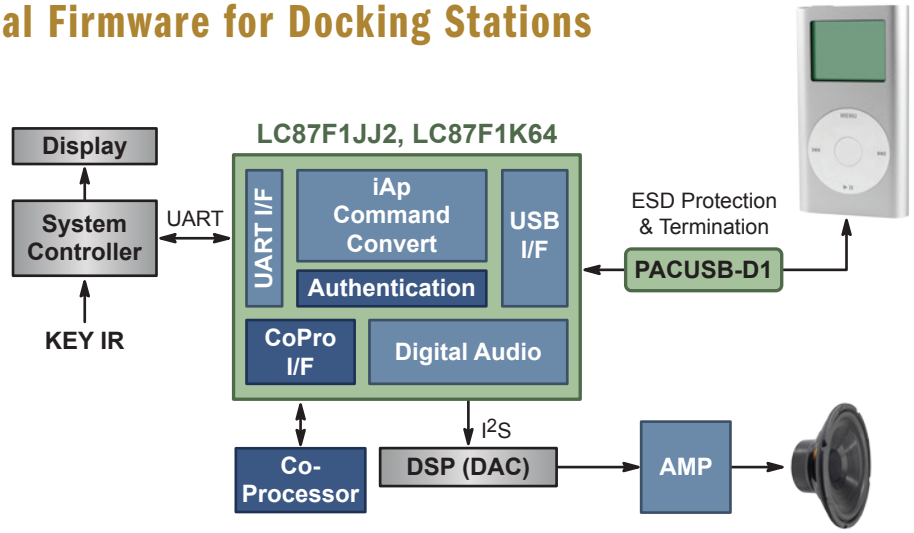
- USB 2.0 full-speed / low speed functions
- USB device function / USB host function
- Integrated voltage regulator
- USB D+ line pull-up function

Device	Type	ROM (kByte)	RAM (Byte)	I/Os	PWMs	UARTs	ADC	LVD	POR	Features	Package
LC87F1A32A	8-bit USB	32	2048	39	2	1	12/8-bit x 12ch	–	–	IR reciever	SQFP-48
LC87F1M16A	8-bit USB	16	1024	38	2	1	12/8-bit x 20ch	✔	✔	UART & SCUART; high current driver	SQFP-48
LC87F1K64A	8-bit USB	64	8192	39	2	1	12-bit x 12ch	✔	✔	USB I/F x 2; USB Host; Audio I/F	SQFP-48
LC87F1HC8A	8-bit USB	128	16384	39	2	1	8-bit x 12ch	–	–	USB Host; Audio I/F	SQFP-48
LC87F1JJ2A	8-bit USB	192	16384	39	2	1	8-bit x 12ch	–	–	USB Host; Audio I/F	SQFP-48
LC87F1JJ4A	8-bit USB	192	20480	39	2	1	8-bit x 12ch	–	–	USB Host; Audio I/F	SQFP-48
LC87F1JJ8A	8-bit USB	192	24576	39	2	1	8-bit x 12ch	–	–	USB Host; Audio I/F	SQFP-48

iChief Digital Firmware for Docking Stations

iChief Firmware Key Features

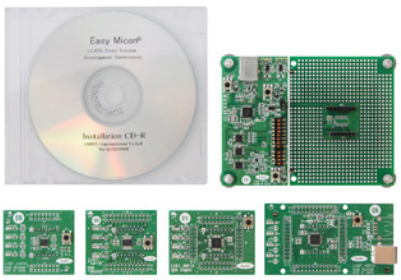
- Support the interface for iPhone® 5 and new iPods® that have only USB interface
- Communicates with iAp via USB
- Supports IDPS features, and performs all the required processes internally

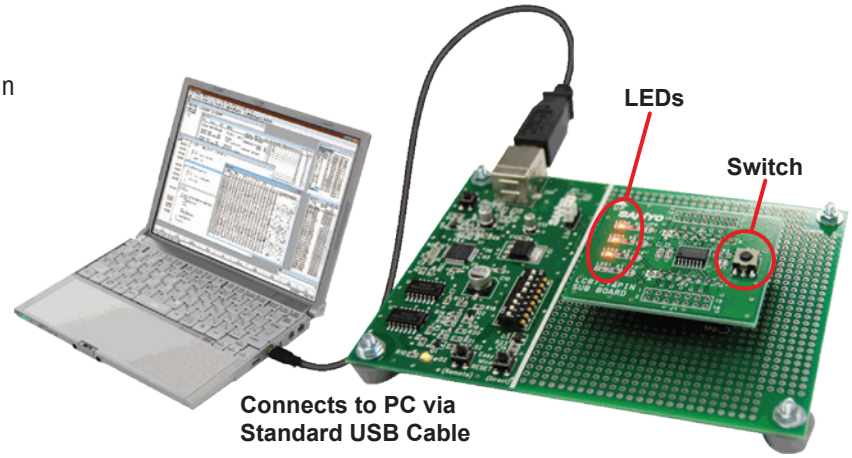


Starter Kit for Software Development

Trial kit includes Main Board, Sub Board, and Development Environment CD. With Main Board as a base, it is possible to connect different Sub Boards with different pin numbers.

- 8 bit Easy Micon Development Tool
  Sub Board Line Up: 16-pin, 24-pin, 36-pin, 48-pin
- 16 bit Xstromy16 Development Tool
  Sub Board Line Up: 48-pin, 64-pin, 100-pin



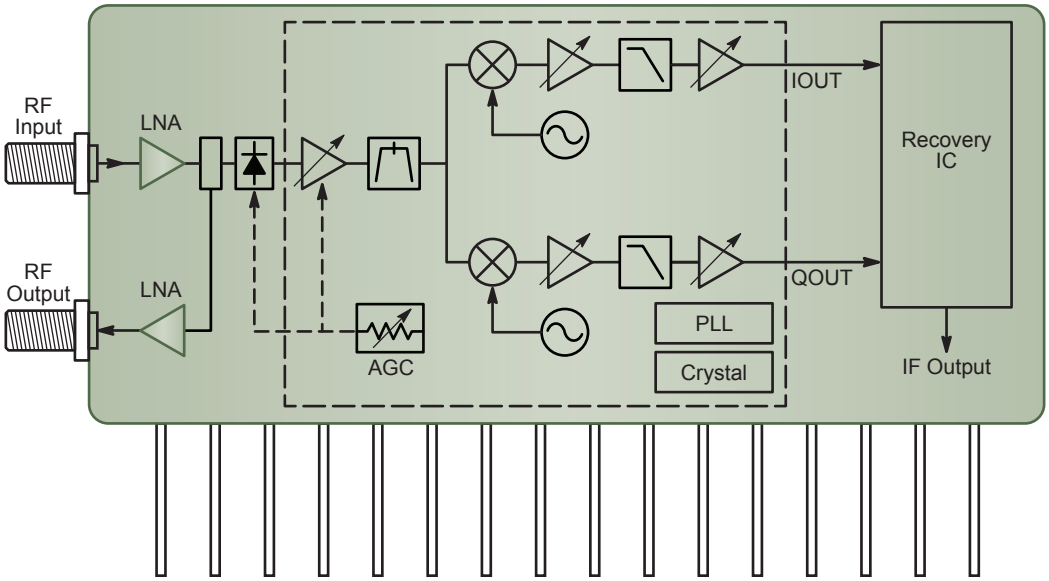


Real Time Display Function
Displays program running situation in real time

On-Chip Debugger System

- Software development with 1 wire communication
- Reduction of development time with Real Time Display function, Break function, and Trace function

Discrete Devices for Satellite TV Tuners



RF Devices for Satellite TV Tuners

Block	Device	V_{CC} (V)	I_{CC} (mA)	Gp @ 1GHz (dB)	NF @ 1GHz (dB)	P1dB @ 1GHz (dBm)	Package(s)
LNA (MMIC)	SMA3103	5	19	26.5	4.7	8.2	MCPH-6 (SC-88, SOT-363)
	SMA3109	3	16	23	4.3	6.4	MCPH-6 (SC-88, SOT-363)

Block	Device	V_{CBO} (V)	V_{CEO} (V)	I_C (mA)	f_T (GHz)	Package(s)
LNA	MCH4020	15	8	150	16.0 @ V_{CE} = 5 V/I_C = 50 mA	MCPH-4 (SC-82, SOT-343)
	MCH4009	10	3.5	40	25.0 @ V_{CE} = 3 V/I_C = 20 mA	MCPH-4 (SC-82, SOT-343)
	MCH4013	10	3.5	15	22.5 @ V_{CE} = 3 V/I_C = 10 mA	MCPH-4 (SC-82, SOT-343)

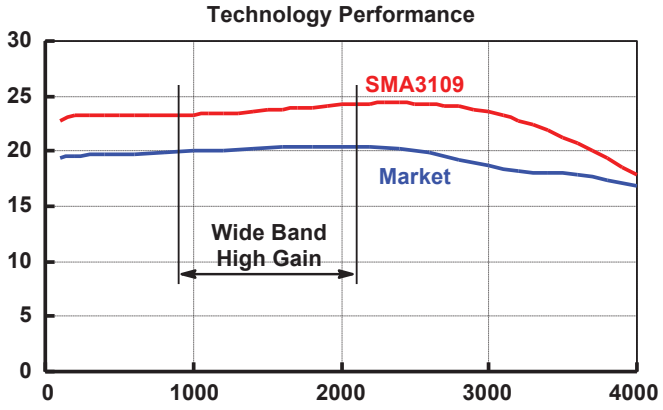
Si-MMIC Series for Satellite TV

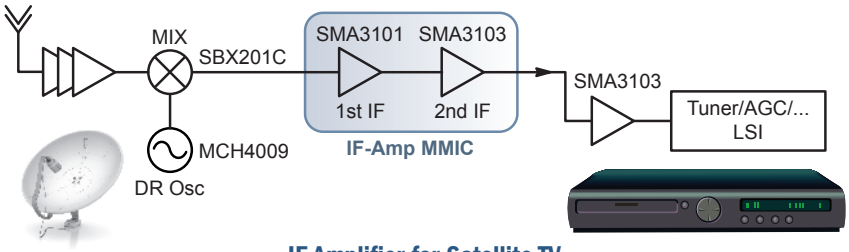
SMA3103 Features

- High Gain: Gp=26.5dB
- Wide Band: f = 950-2150 MHz
- Low Current: I_{CC} = 19 mA
- High Power: P1dB = 8.2 dBm
- Package: MCPH-6 (SOT-363, SC-88), 2.0 x 2.1 x 0.9 mm

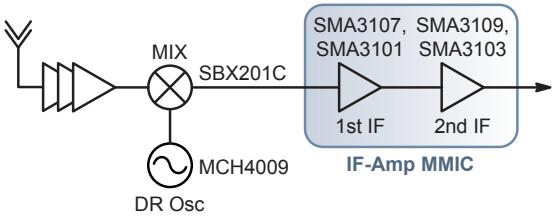
SMA3109 Features

- Low Voltage: V_{CC} = 3 V
- Low Current: I_{CC} = 16 mA
- High Gain: Gp = 23 dB
- Wide Band: fu = 3.6 GHz
- High Power: P1dB = 6.4 dBm
- Package: MCPH-6 (SOT-363, SC-88)



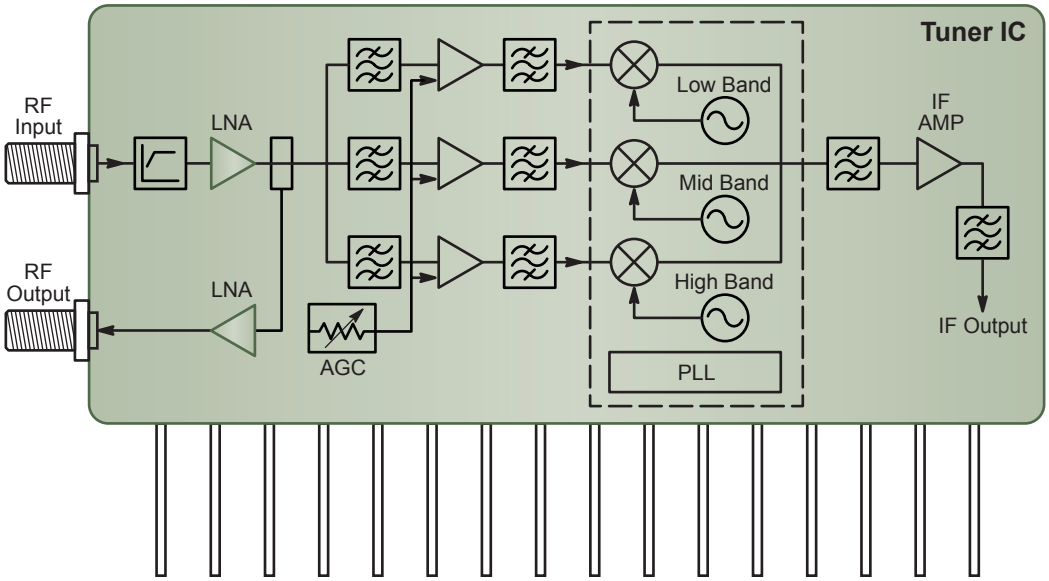


IF Amplifier for Satellite TV



IF Amplifier for LNB, STB, TV

Discrete Devices for Terrestrial TV/CATV Tuners



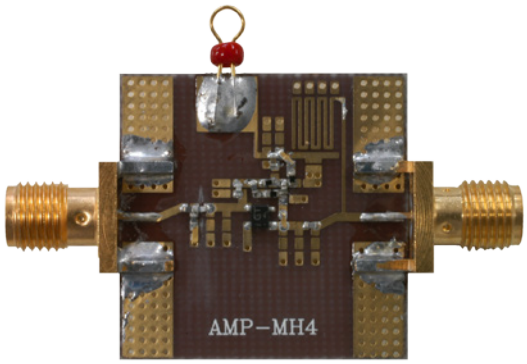
RF Devices for Terrestrial TV/CATV Tuners

Block	Device	V_{CBO} (V)	V_{CEO} (V)	I_C (mA)	f_T (GHz)	Package(s)
LNA	MCH4014	20	12	30	10.0 @ V_{CE} = 5 V/I_C = 10 mA	MCPH-4 (SC-82, SOT-343)
	MCH4015	20	12	100	10.0 @ V_{CE} = 5 V/I_C = 50 mA	MCPH-4 (SC-82, SOT-343)
	MCH4020	15	8	150	16.0 @ V_{CE} = 5 V/I_C = 50 mA	MCPH-4 (SC-82, SOT-343)
	CPH6001A	20	12	100	6.7 @ V_{CE} = 5 V/I_C = 30 mA	CPH-6 (SOT-457)
	2SC5226A	20	10	70	7.0 @ V_{CE} = 5 V/I_C = 20 mA	MCP (SC-70, SOT-323)

MCH4000 Series for Terrestrial TV/CATV Tuners

MCH4014, MCH4015 Features

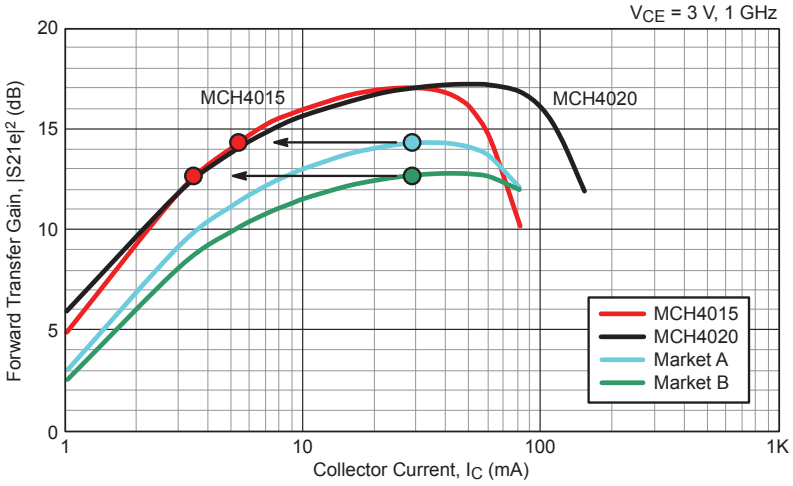
- High Voltage: V_{CEO} = 12 V
- High Gain: MCH4014: $|S21e|^2$ = 18 dB typ (f = 1 GHz, V_{CE} = 5 V)
  MCH4015: $|S21e|^2$ = 17 dB typ (f = 1 GHz, V_{CE} = 5 V)
- Low Noise: NF = 1.2 dB typ (f = 1 GHz, V_{CE} = 1 V)
- Package: MCPH-4 (SC-82, SOT-343), 2.0 x 2.1 x 0.85 mm



MCH4020 Features

- High Cut-off Frequency: f_T = 16 GHz
- High Gain: $|S21e|^2$ = 17.5 dB typ
- Low Noise: NF = 1.2 dB typ (f = 1 GHz, V_{CE} = 1 V)
- Package MCPH-4 (SC-82, SOT-343), 2.0 x 2.1 x 0.9 mm

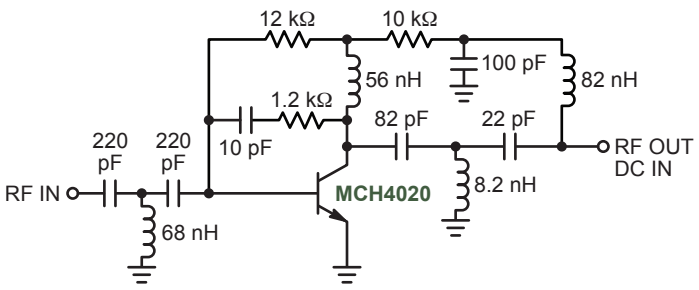
MCH4000 series demonstrates good performance with high gain characteristics, even under low electric current.



Material	FR4
Thickness	400 μm
Conductor	Au
Condcutor Thickness	20 μm
Dielectric Constant	4.7
Dielectric Loss Tangent	0.02
Size	25.4 mm²

Parameter	Symbol	Value	Unit
Voltage	VCC	2	V
Circuit Current	ICC	10.5	mA

Parameter	Symbol	Value		Unit
Frequency	F	500	800	MHz
Power Gain	Gp	15.3	14.3	dB
Noise Figure	NF	1.35	1.42	dB



MCH4020 Application

LC75055 Integrated Audio DSP, A/D, D/A, and Volume Control

LC75055 Features

- Integrated Solution
  - 220 MIPS DSP
  - Analog: 24-bit ADC (6ch), 24-bit DAC (6ch), EVR (6ch)
  - Digital (I2S) I/F(5ch input / 3ch output)
  - Built-in Flash memory
- Hardware Sampling Rate Converter (8 – 96 kHz sampling frequency
- Both analog and digital sources are available; the LSI can select between the sources
- All-in-one package (audio I/O, EVR, selector, audio enhancer, etc.) enables reduction in development schedule
- Various optional functions are selectable in the DSP software, within the throughput of the DSP (some software may require a license agreement)
- Supply voltage 1.5 V and 3.3 V
- Operates from: 11.2896 MHz (44.1 kHz * 256 fs) or 12.288 MHz (48 kHz * 256 fs) crystal oscillator
- BUS control tuner which can be selected by I2C or SPI
- -40°C to +85°C operation
- QIP-100E package
- Evaluation board with control GUI

LC75055 Software Functions

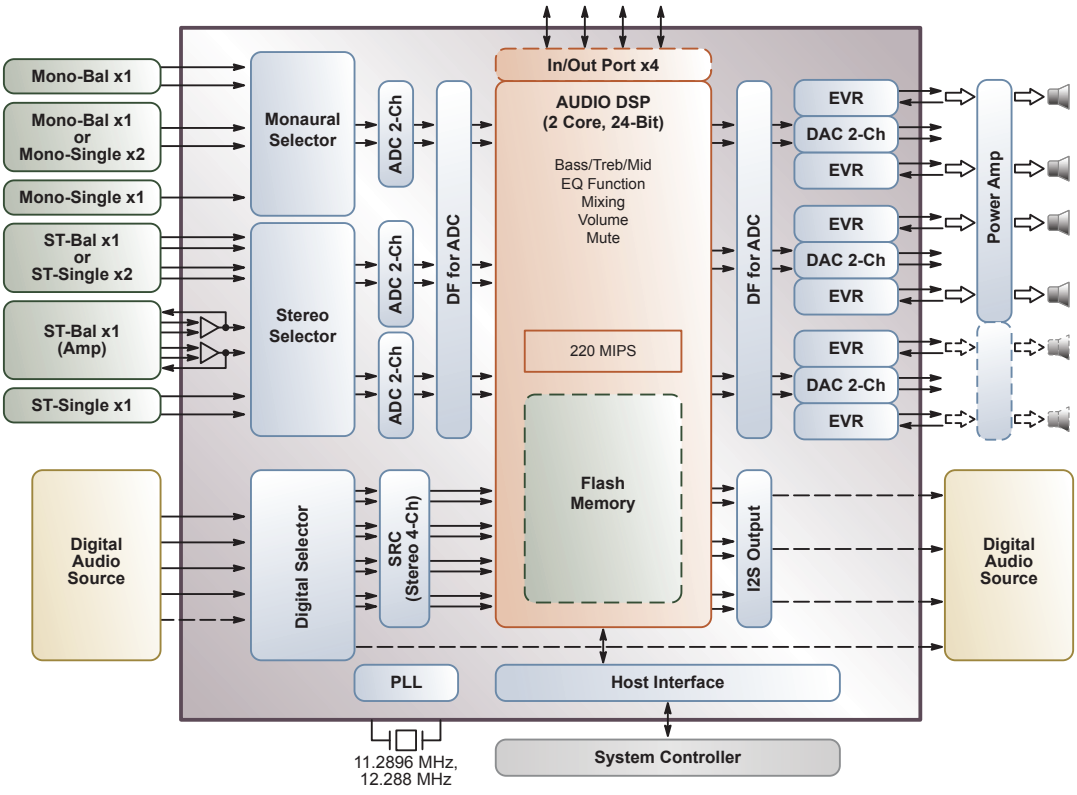
- Fully Customizable from attractive libraries
- Up-to-date sound technology DPS
- Control GUI with customized LSI

Standard Functions

- Bass/Middle/Treble
- Loudness
- 4ch x 7 bands EQ
- S3S, AViSS
- New S-Live
- Volume (Hard & Soft)
- Delay time
- Fader/Balance
- Chime Sound

Optional Functions

- Additional EQ
- Dolby
- Engine Sound
- Compressor (AGC)
- Changed Base Functions
- Hands-free function
- Bongiovi DPS (special case)

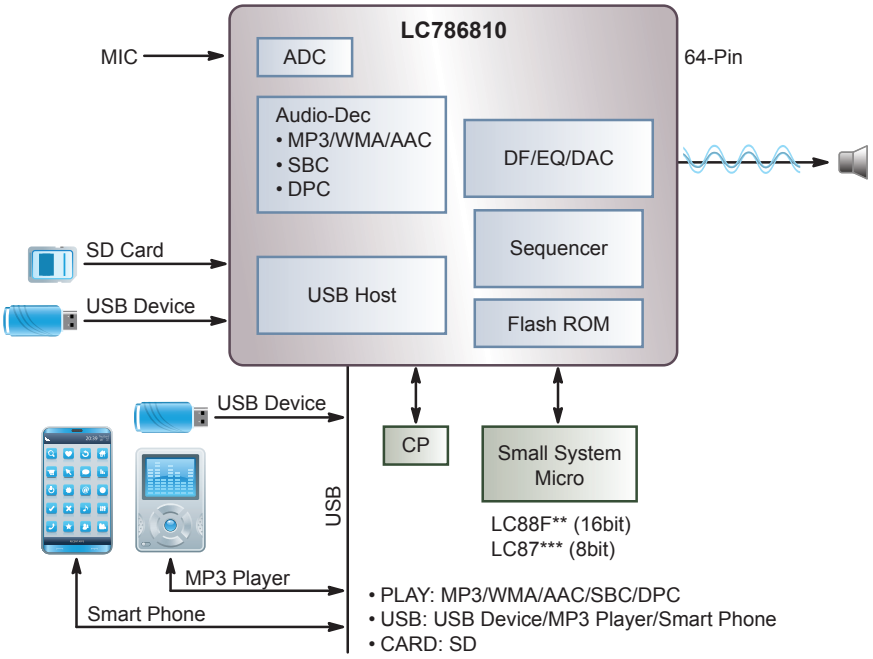


LC75055 System Diagram

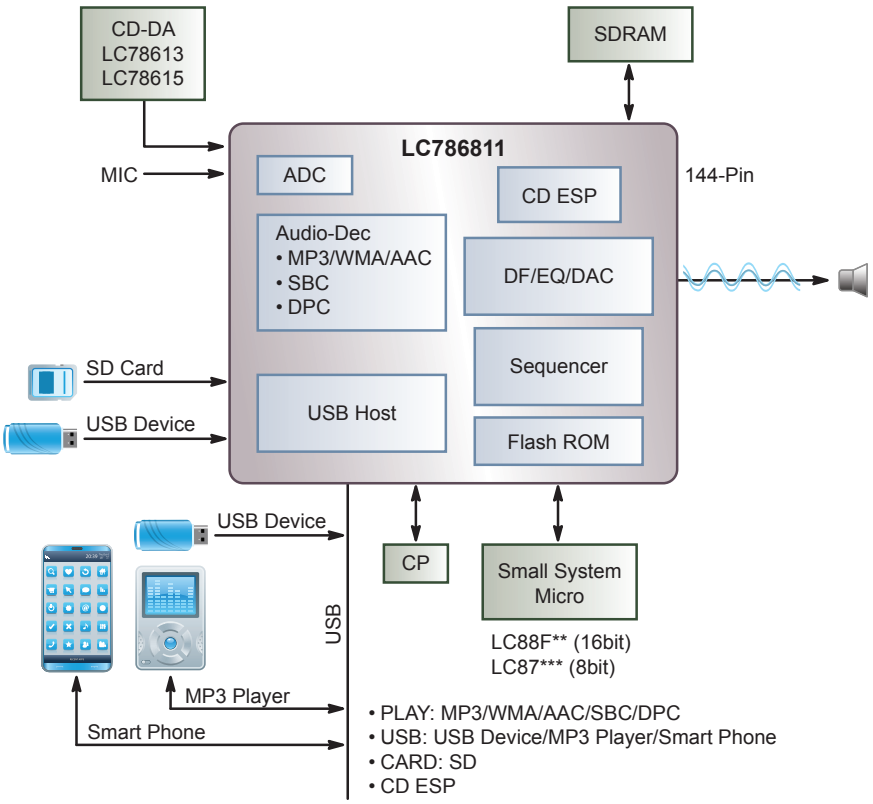
LC786810/LC786811 Compressed Audio DSP with (or w/o) CD Mech

LC786810*/LC786811* Features

- Easy control with built-in sequencer
- Good audio I/F
- DPC (Digital Pitch Control) function
- Easy model expansion to CD system (LC786811 only)
- 2 port USB/SD host controller
- Built-in Flash-ROM for sequencer
- Original surround
- MP3/WMA/AAC decoder
- MP3 encoder
- QIP-64E and SQFP-144 packages



LC786810 Application Example (CD-Mech-less System)



LC786811 Application Example (CD System)

* Pending release.

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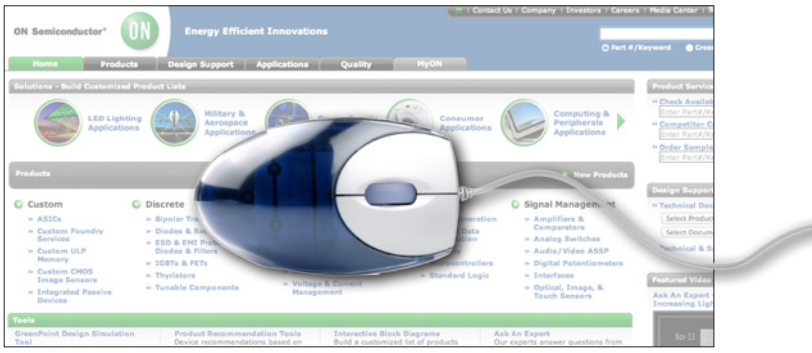

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